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THE MEDICAL JOURNAL OF AUSTRALIA

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Table of Contents

THE PATHOGENESIS OF RENAL TUMOURS.[1]

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Introduction.

DESPITE or perhaps because of a great deal of work, the pathology of tumours of the kidney remains confused. The classifications put forward in the past have been cumbersome and complicated. Surgeons unable to follow have scornfully disregarded them. Thus Binney[7] says:

"From the pathological anatomy no common basis of classification of malignant disease can be deduced, nor is it of great importance from a clinical standpoint. Malignant tumours of widely varying structure are so uniform in symptoms and course that of however great pathological interest the precise point of origin . . . or the determination of the . . . nature of a given tissue are not essential to the surgeon.

This reproach to the pathologist has been justified, but it can and must be removed. The clinical course depends directly on the origin and nature of the tumour. An appreciation of the pathology is the basis of successful treatment. This paper is the result of a study of sixty-six cases of renal and adrenal tumours, constituted as follows:

Tumours in the kidney—	
Wilms mixed tumour	4
Adenoma	20
Grawitz carcinoma	18
Embryonal carcinoma	3
Pelvis carcinoma	4
Capsule tumours (fibroma, 2; lipoma, 1)	3
Tumours in the suprarenal gland—	
Adenoma of cortex	5
Carcinoma of cortex	8
Neuro-cytoma of medulla	1

In it I will endeavour to show how the confusion has arisen and to put forward their pathology in a simpler way.

From the confusion two tumour types have gradually emerged and established themselves, the infantile *Mischgeschwulst* of Wilms and that tumour of adults first clearly defined by Grawitz, to which Birch-Hirschfeld gave the name "hypernephroma." These are often called after their describers the Wilms and the Grawitz tumours respectively. Table A shows their relative frequency according to various authors. It will be seen that generally the more modern the series, the greater the proportion taken up by the two types. I will take first these two established forms and then deal with the less clearly defined forms.

[1] Read at a meeting of the Victorian Branch of the British Medical Association on May 3, 1922.

TABLE A.—RELATIVE FREQUENCY OF RENAL TUMOURS.

Name of Authority.	Date	Total Number of Cases.	*Mischgeschwülste* (Wilms).	Hyper-nephromata (Grawitz)	Both Types Combined.
Older Series:					
Israel[18] ..	1901	43	4.5%	39.5%	44%
Albarran & Imbert[3] .	1903	600	10%	15%	15%
Recent Series:					
Ipsen[15] ..	1912	42	5%	83%	88%
Wilson[22] ..	1913	92	3%	77%	80%
Binney[7] ..	1914	110	25%	39%	64%
Hyman[14] ..	1921	40	20%	70%	90%
The Author's Series.. ..	1922	29[1]	14%	62%	76%

The Wilms Tumour.

The Wilms tumour of the kidney almost invariably attacks infants; 75% occur before the age of five and the majority of the remainder before ten (see Figure XIII.). It is malignant, grows rapidly and usually recurs after nephrectomy.

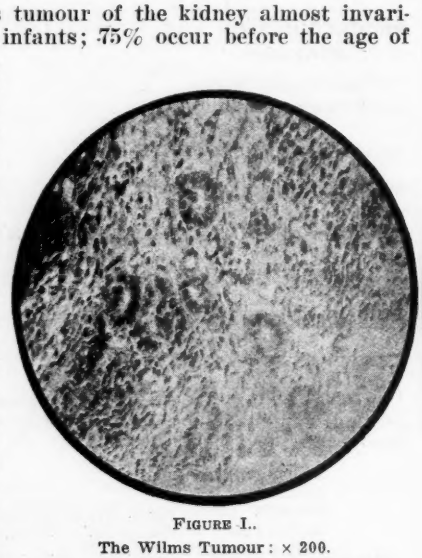

FIGURE I..

The Wilms Tumour: × 200.

Note areas of undifferentiated spindle cells, imperfect and well-formed tubules, open mucoid connective tissue.

A good example of this type of tumour is the one that was shown before the Pædiatric Society last year, which I have had the opportunity of examining through the courtesy of Dr. Douglas Stephens and Dr. Webster. This child developed symptoms first at the age of fifteen months and six months later was taken to the Children's Hospital, where nephrectomy was done by Dr. Stephens. Five months later he returned with recurrence and died. At the autopsy secondary growths were found in the region of the kidney, throughout the liver, which weighed 2,950 grammes (104 ounces), and in the heart.

The most striking characteristic of these tumours is the combination on microscopic examination of adenoma-like tubules with broad bands of indifferent spindle-celled tissue (see Figure I.). This appearance caused Wilms to name them *Mischgeschwülste* and other writers adeno-sarcomata.

As well as these two principal features, two others are often seen—smooth muscle and myxomatous embryonal connective tissue. It is evident from the absence of basement membrane round most of the tubules and the merging of the various tissue types into one another that all the cells are of common origin. The other three types have differentiated from the simple spindle cells. The spindle cells are potential epithelial, muscle or connective tissue cells and are therefore analogous to the cells from which the kidney developes. All agree that these tumours arise through a disturbance of normal development of the kidney. Because of the occasional presence of striated muscle, cartilage and bone, Wilms and others thought the disturbance must take place very early in intra-uterine life and implicate sclerotome and myotome, as well as nephrotome. But striated muscle is not common in the tumour, cartilage and bone are rare and the more modern view dates the disturbance much later in the period of elaboration of the permanent kidney or metanephros.

Nicholson[19] has emphasized the strong resemblance microscopically between the Wilms tumour and the kidney of a fœtus of three months (see Figure II.). The typical features of the latter are the same four—undifferentiated spindle cell areas, immature tubules, mucoid connective tissue and smooth muscle — that characterize the former.

FIGURE II..

The Fœtal Kidney, 3½ months: × 200.

Note areas of undifferentiated spindle cells and the imperfect and fully developed tubules and glomeruli.

The Grawitz Tumour.

The Grawitz tumour or hypernephroma is by far the commonest tumour in the kidney. Of all tumours, it comprises about 70%, of tumours in adults over 80%.

The term hypernephroma should be abandoned. Applied to renal tumours, it is incorrect and misleading, as it supposes an adrenal origin; applied to tumours in the suprarenal it is indefinite, for it includes both benign and malignant forms. In this paper the renal hypernephroma will be referred to as the "Grawitz tumour," while for the adrenal neoplasms the more simple and exact terms adenoma and carcinoma will be used.

The naked-eye appearance of the tumour is characteristic. It arises with equal frequency in all parts of the cortex. The shape is rounded and the size varies between that of a cherry and a man's head. As a rule, it does not infiltrate the kidney,

[1] Excluding the small tumours discovered *post mortem*.

but is separated from it by a fibrous capsule. The substance is divided by fibrous trabeculæ and presents a striking colour contrast—the bright yellow of fat content, the red, brown and black of hæmorrhage and the translucency of mucoid change. Cysts are common and areas of massive necrosis occur.

Microscopical descriptions are not so unanimous. The typical cell is large, with a small, round nucleus and cytoplasm which stains so faintly as to call forth the appellation glassy. The swelling is mainly due to fat, though Stoerk[20] considered it a "hydropic degeneration" related in some way to the glycogen content. One of the great causes of confusion has been the over-emphasis on histological details, many of which are the result of degenerative changes. There may be the greatest variation in the microscopic appearance of different parts of the same tumour. Because of this diversity, the Grawitz tumour in the past has figured as myxosarcoma, liposarcoma, endothelioma, etc.. Conclusions based on one section may be misleading. It is important to examine several portions of each tumour.

FIGURE III..
The Grawitz Tumour: x 200. Open papillary structure.

Of the various appearances, two are by far the commonest:

(1) The open papillary type (see Figure III.), an open arrangement where the cells, columnar in shape, are set in a single row along delicate vascular connective tissue strands.

(2) The cordon type (see Figure IV.), a solid structure, where the cells are packed in short, narrow columns between fine fibrous septa. This structure undoubtedly resembles the *zona fasciculata* of the adrenal cortex, a fact emphasized by Grawitz's supporters.

The first type is the more characteristic, though the other is common and modern authors usually depict them both (Ewing,[10] Choyce,[9] Cabot[7]). Ipsen[15] described a third intermediate type; he has established the histological unity of the tumour by showing that the three merge insensibly into one another and that they all arise by modification of a common parent type—a form allied to the papillary adenoma.

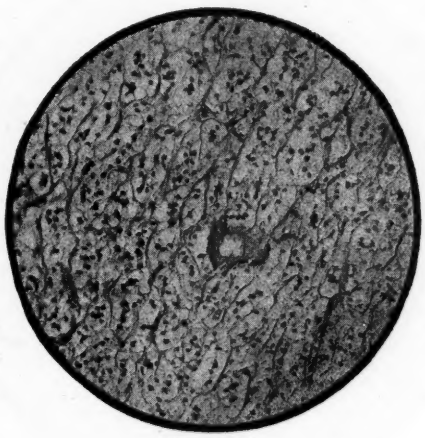

FIGURE IV..
The Grawitz Toumur: x 200. "Hypernephroma" cordons.

Grawitz's Theory.

The second great cause of confusion has been the misleading hypothesis of Grawitz that these tumours grow from misplaced portions or rests of adrenal tissue in the kidney. This hypothesis has been rejected by all recent investigators, but it remains firmly entrenched in surgical text-books. Therefore, a discussion of the evidence for and against it is warranted.

"The presence of adrenal rests in the kidney is fully attested, although they are probably less frequent than many have supposed."—Ewing. The Melbourne University Pathology Department contains two examples.

One was obtained from a man who died at the age of fifty-seven from cerebellar glioma. Both suprarenals were very thin and spread out. Quite distinct from them, a small supernumerary one, about four millimetres in diameter, was found beneath the capsule of the right kidney. Microscopically it exactly resembled adrenal epithelium. It was not in any way capsulated, its cordons penetrating in between the renal tubules. There was in it no evidence of abnormal cellular activity, nor was the surrounding renal tissue compressed. There was no sign of chronic inflammation in the kidney (see Figure V.).

The second man died of carcinoma of the stomach with terminal pneumonia at the age of seventy-one. The rest, one millimetre × two millimetres in size, was situated in the capsule of the right kidney on the anterior surface near the hilus. Microscopically all three zones of the adrenal cortex were suggested and a central vein was present, but no sign of medullary cells. The rest was well capsuled from the kidney, except where some adrenal cells had grown alongside its vein, where it entered the kidney. There was excess of interstitial fibrous tissue in the kidney, as well as macroscopic evidence of a moderate grade of chronic nephritis.

As rests do exist, the possibility of their neoplastic development cannot be denied. Indeed, one of the cases described by Fraser[11] appears to be a true example and Zehbe[27] accepts Neuhäuser's case. Such undoubted cases are, however, rare. It would require very strong evidence to convince that the majority of tumours in the kidney were derived from these infrequent and minute fragments of adrenal tissue rather than from the overwhelmingly greater mass of renal tissue. In support of his theory, Grawitz drew attention to:

(1) The subcapsular position of both adrenal rests and Grawitz tumours.

(2) The tumour cells, which, in their large size and especially their fat content, resemble adrenal rather than renal epithelium.

(3) The cordon structure.

Let me briefly review these arguments.

Firstly, a more searching topographical comparison reveals dissimilarity of site. Adrenal rests have been described in many places in the abdomen—liver, pancreas, testis, ovary, broad ligament, but no authentic Grawitz tumour has ever been found outside the kidney. In the kidney itself the adrenal rests are almost confined to the upper pole, whereas Grawitz tumours are evenly distributed throughout the organ.

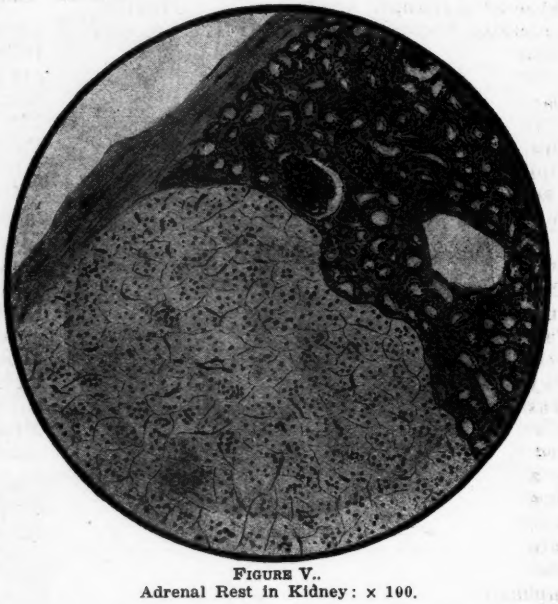

FIGURE V..
Adrenal Rest in Kidney: × 100.

Secondly, whatever may be the cause of the large size of the Grawitz tumour cells, all observers agree that it is a form of degeneration. Alongside the swollen cells may often be seen the more healthy, small, well-stained cells which are to be regarded as the primary type from which the others have regressed. A comparison between a normal adrenal cell and a degenerate tumour cell is unsound. The small cells do not occur in the adrenal gland, but are very like the cells of renal tubules, which may, under certain conditions, undergo these degenerative changes.

Fat is normally absent from renal epithelium, but is a characteristic feature of adrenal cells. Stress has therefore been laid on the presence of fat in the Grawitz tumour as suggesting an adrenal origin. But the fats differ. That in the adrenal is physiological; that in the tumour is a fatty degeneration such as occurs in most tumours, for it is scanty in the actively growing areas and abundant in the older necrotic portions. Fat may also occur in renal cells under many pathological conditions. Never does the fat content of tumours, including the Grawitzian, reach the high proportion in the normal adrenal gland.

Ipsen's figures are:

Grawitz tumour, 4% to 10.7%; lung metastasis of colon carcinoma, 14.9%; normal horse adrenal, 30.8%.

Thirdly, the cordon structure, as has already been mentioned, is only one of several structure types that the tumour may adopt. The other papillary formations are not consistent with an adrenal origin, whereas a renal will readily account for all structure types.

Thus Grawitz's arguments, though at first sight suggestive, are seen on closer examination to be valueless. There is also strong positive evidence in favour of a renal origin and I propose to discuss this by comparing the Grawitz tumours in turn with (1) the renal adenomata and (2) tumours growing in the suprarenal gland.

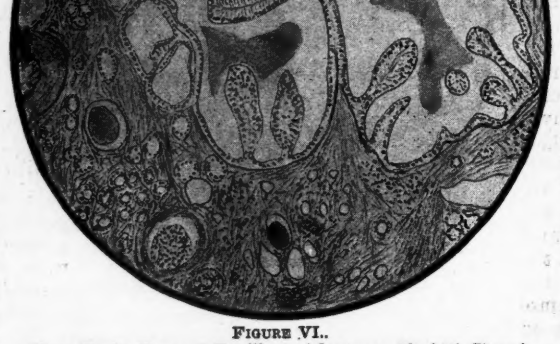

FIGURE VI..
Very Early Type of Papillary Adenoma; Marked Chronic Nephritis: × 100.

The Renal Adenomata.

If a chronically inflamed kidney be examined, it is not unusual to find small cysts in the cortex. As a rule, they are retention cysts and the lining epithelium becomes flattened and degenerate. But occasionally, as in Figure VI., the lining cells are high columnar and healthy looking, that is, cell proliferation has more than kept pace with the distension. Papillary processes may grow from the cyst wall and project into the cavity and their formation represents the crossing of the boundary from compensatory hypertrophy to the feeblest type of new growth — the papillary cystoma.

If continued growth with repeated branching of these papillary processes occur, it will lead to filling up of the cyst cavity and atrophy of the epithelial investment

from internal pressure. Also a section through the centre will, because of their complexity, cut papillary formations in all phases—longitudinal, transverse and oblique. Instead, then, of a cauliflower appearance, will be seen a series of branching lumina lined by a single layer of epithelium, supported on a delicate fibrous stroma. Such is the tubular adenoma (see Figure VII.).

A tumour of this kind cannot be distinguished by the naked eye from a small Grawitz tumour and microscopically also the distinction becomes difficult. The open papillary structure of the Grawitz tumour is merely that of the adenoma opened out and rather more irregular. Case 17 of my series is interesting. This tumour was found *post mortem* in the very contracted kidney of a man of sixty-five. It was about 2.5 centimetres in diameter and thinly encapsuled. Figure VIII. shows it as a tubular adenoma, yet Figure IV., taken from a different part, has served to illustrate typical "hypernephroma" cordons. The case further emphasized its advancement to a Grawitz tumour by a fatal metastasis in the brain.

FIGURE VII..
The Tubular Adenoma: × 150.

My series includes two other transition cases and many have been described under such terms as adeno-carcinoma or malignant adenoma. It has been fully realized that the boundary between benignity and malignancy is difficult to define. This uncertainty constitutes a diagnostic problem, but it emphasizes the absence of any fundamental difference between the tubular adenoma and the Grawitz tumour.

Figure IX. is taken from a tumour that in most places has an open papillary structure. In other places, as in the figure, the tumour is more active, the nuclei are larger and the cells have broken away from a papillary formation and have adopted a *carcinoma simplex* structure. Such a case as this is admitted as a renal carcinoma by those who deny the term to the Grawitz tumour and substitute for it hypernephroma. But this example, which is not uncommon, indicates the identity of the two types and there is no justification for their separation.

FIGURE VIII..
Case 17. Area Like a Tubular Adenoma: × 200.

It is possible, therefore, to arrange these tumours in a progressive series, which begins with the hypertrophying cells of the renal tubules and continues unbroken through the various adenomata and the Grawitz tumours to the most malignant type—a *carcinoma simplex*. For the most part the fundamental structure is similar, the variant being the degree of activity. The types at each end of the series—the adenoma and the *carcinoma simplex*—are accepted as renal; it is impossible to doubt the renal nature of the intermediate members. The Grawitz tumour must be regarded as a carcinoma of the renal tubules. It is not implied that each Grawitz cancer passes through the several adenoma stages. The adenomata represent tumours with only a limited neoplastic impetus; the greater the impetus, the further advanced will be the type reached. But they do give an indication of the method of growth and establish the origin of the more malignant forms.

Tumours of the Suprarenal.

If Grawitz tumours grow from suprarenal tissue they should be exactly paralleled by tumours in the suprarenal gland itself. The two tumour types may be compared under three headings: (*a*) Histology. (*b*) General pathology. (*c*) Symptomatology.

In discussing adrenal tumours, it is necessary to distinguish clearly between those of the cortex and those of the medulla. The medulla is of the same ectodermic origin as the sympathetic ganglia and consists of large, polymorphic, branching cells irregularly arranged. Its tumours are mainly neurocytomata occurring in infants and do not concern the Grawitzian argument. The cortex is developed from the mesothelium of the Wolffian ridge and consists of polyhedral epithelial cells not clearly distinct from one another, more or less regularly arranged between delicate fibro-vascular septa. It is the cortical tumours that are comparable with the renal and as Adami[1] suggests, some similarity is expected between tumours of tissues so closely related embryogenetically. Nevertheless, the properties of an adult cell are more significant in determining the nature of a derived tumour than those of its embryonic ancestor. For the same reason mesothelioma is a less apt term than carcinoma.

(a) Histology.

The structure of adrenal adenomata is very similar to that of the *zona fasciculata* of the normal gland, except that the columns tend to be wider,

longer and less regularly arranged (see Figure X.). Some of the carcinomata have in their least active parts this simpler structure; in other places the columns give way to alveoli containing quite irregularly arranged tumour cells.

In a still more malignant area (see Figure XI.) the cells are polymorphous with large nuclei, frequently multiple or dividing and without any systematic structure. Thus a leading feature of Grawitz tumours—the hypernephroma cordon structure—though present in the normal suprarenal cortex, becomes progressively less evident with activity of its tumours and does not occur in the more malignant examples.

FIGURE IX..
Case 34. Grawitz Tumour: × 100. Nodule with Structure of *Carcinoma simplex*.

A papillary structure is very rare in adrenal derivatives. The vast majority of its tumours are solid and it is stated that adrenal tumours never adopt a papillary form. One of my cases of adrenal carcinoma is papillary in nature. But it is exceptional and the predominance of papillary structure in Grawitz tumours remains a convincing argument against their adrenal nature.

(b) General Pathology.

The adrenal carcinoma is much more highly malignant than the Grawitz tumour.

This has already been noticed histologically from the comparative regularity of structure, the large amount of cytoplasm and the small round inactive nucleus of the Grawitz tumour compared with the irregularity of cell arrangement, the scanty cytoplasm, the large nucleus with frequent mitoses and giant cells in the adrenal carcinoma. To naked-eye observation the Grawitz tumour is rounded and well demarcated. It rarely infiltrates the kidney or grows diffusely. On the other hand, the adrenal carcinoma is very imperfectly capsuled and frequently infiltrates neighbouring organs.

FIGURE X..
Adenoma of Suprarenal Cortex.

The Grawitz tumour is slow growing. It is not uncommon for symptoms to exist for years before operation. Wilson[21] recorded a case in which hæmaturia had been present for ten years and a palpable tumour for four. Other examples are Binney's case, in which the symptoms had existed for seven years, and Michaëlsson's, [18] in which they had existed for six years. Cases are also on record of recurrence as long as ten years after nephrectomy.

Table B gives the duration of history of various series. Care has been taken to admit the duration of only those symptoms which can with reasonable certainty be attributed to the tumour.

It will be seen that on the average there is evidence of the existence of the tumour for from nine to twenty-eight months before advice is sought. In my own series one was stricken suddenly by a cerebral metastasis; in the others the longest duration of symptoms was three years, the shortest six weeks and the average 9.1 months.

Compare these with the adrenal figures. The longest duration among my cases was 6.8 months, the shortest seven weeks and the average 20.5 weeks, that is, 4.7 months. Each of Wilson's two patients lived only four months after the onset of symptoms. The contrast is heightened by the fact that the Grawitzian figures represent the interval between the onset and seeking of advice, whereas the adrenal figures give the complete duration till death. Evidently, therefore, adrenal

carcinomata bring about a fatal issue much more speedily than the Grawitz tumours.

The most remarkable feature of the Grawitz tumour is the way in which long before the primary tumour is suspected a secondary growth may lead the patient to seek advice. The patient in Case 38 of my series died from a cerebral metastasis and the correct diagnosis was only made at autopsy. Bland Sutton[8] described the case of a man who remained well for over five years after the removal of a pseudo-primary tumour from the humerus before finally succumbing to other metastases. Bland Sutton regarded the primary as adrenal, but from the description and illustrations it undoubtedly was a Grawitz tumour of the kidney.

Four of Albrecht's[4] patients were operated on under the impression that the metastases were primary bone diseases and one man remained well for five years before other secondaries appeared.

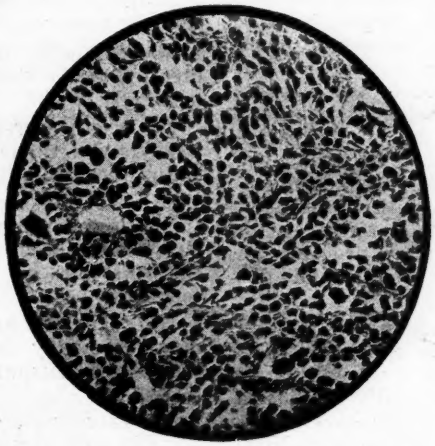

FIGURE XI.
Carcinoma of Suprarenal Cortex: × 200.

Such instances are possible because of the slow growth of the primary tumour and because the metastases are few in number, often solitary. Any extensive distribution is rare. Of my nine patients who came to autopsy, only four had secondary growths and in none of them were they numerous. The formation of late metastases is another characteristic peculiarity.

Instances in which ten years had elapsed after nephrectomy before the secondary growths reached a clinically observable size, have been recorded by Lotheisen,[17] Michaëlsson and others. Also many tumours of prolonged duration have been successfully removed without recurrence.

In each of my eight patients with adrenal growths, some secondary tumours were found, except the patient of Case 59, who died prematurely from another cause. In most of them the metastases were very numerous and wide-spread; in Case 62 practically every organ in the body was invaded. In both of Wilson's cases numerous secondary growths were present.

The general pathological evidence shows that, because of the inactive cell nature, the quiet, expansive method of growth, the prolonged duration and the sparsity of metastases, the malignancy of the Grawitz tumour cannot be regarded as high. On the other hand, the active cellular proliferation, the tendency to infiltrate, the rapid course and the general dissemination proclaim carcinoma of the suprarenal cortex one of the most malignant of all tumours.

TABLE B.—SYMPTOMS AND DURATION OF COURSE.

(1) Grawitz Tumours of Kidney.

Author.	Date.	Number in Series.	Duration.			Symptoms: Percentages.			
			Longest.	Shortest.	Average.	Hæmaturia.	Pain.	Tumour.	Wasting and Weakness.
Albrecht[4] ..	1905	28	6 years	4 days	14.5 months	39.3	41.6+	92.8	46.4
Wilson[21] ..	1910	32	10 years	6 weeks	27.9 months	87.5	90.6	93.7	40.6
Berg[6]	1913	32	2 years	Few months	——	37.5	62.5	—	12.5
Hyman[14] ..	1921	28	4 years	1 month	16.2 months	90	40	85	Late
Michaëlsson[18]	1921	26	6 years	1 month	18.8 months	92	73	81	23
Wright[26] ..	1922	13	13 years(?)	5 weeks	40 or 11 months	—	—	—	—
Derrick	1922	17	3 years	6 weeks	9.1 months	70.6	70.6	82.3	58.8

(2) Carcinomata of Suprarenal.

Author.	Date.	Number in Series.	Duration.			Symptoms: Percentages.			
			Longest.	Shortest.	Average.	Hæmaturia.	Pain.	Tumour.	Wasting and Weakness.
Wilson[23] ..	1913	2	4 months	4 months	4 months	0	100	? 50	Prob. 100
Derrick	1922	5	6.8 months	7 weeks	4.7 months	—	—	—	—
		6				0	83.3	16.7	100

(c) Symptomatology.

Table B presents for comparison the clinical features of Grawitz tumours and adrenal carcinomata. The figures are obtained from various authorities, as well as from my own series.

It will be seen on reference to the table that of the three classical symptoms of Grawitz tumour, pain is the only one that occurs frequently with adrenal carcinoma. A palpable tumour is much less common and hæmaturia is rare. These differences may be of great importance to the diagnostician, but they depend on the anatomical relations of the organs and have no bearing on the pathogenesis. General weakness and loss of weight are not common in the renal series, apart from complications, but are almost invariable with the adrenal cases. This might be referred to interference with adrenalin output, but is much more probably an indication of the rapidity of growth and dissemination.

Glynn[12] has studied these tumours in relation to sex and growth effects. He concludes that, whereas adrenal hypernephromata are usually associated with sex abnormalities, especially in females and the young, renal hypernephromata have no apparent influence on growth or sex characters. None of my thirteen adrenal cortical tumours, all in adults, was accompanied by any sex symptom, but one patient (Case 54) showed pronounced endocrine disturbance.

This patient was a woman, aged fifty-seven, who was enormously stout and had a curious dark pigmentation of the face. She died from chronic nephritis and cardiac failure and *post mortem* an adenoma one centimetre in diameter was discovered in the left suprarenal cortex. The adenoma was more likely a part of a general endocrine disturbance than its cause.

In no instance among my renal adenomata or Grawitz tumours did any apparent sex, growth or other endocrine abnormality occur. It must be admitted that the value of Glynn's argument applied against the Grawitzian theory is seriously diminished by the age of most of the patients. Adrenal tumours do not as a rule cause sex symptoms in adult males or in females after the menopause. Therefore, their absence is of little significance in a series of patients with renal tumours nearly all older than forty.

A symptomatic comparison therefore produces some confirmative, though not of itself conclusive, evidence against the adrenal nature of the Grawitz tumour. The important points are two:

(1) The much more common association of wasting and weakness with the adrenal carcinoma, indicating more vigorous neoplastic activity.

(2) The sex and endocrine disturbances that may accompany the adrenal carcinoma, but never the Grawitz tumour.

The following three facts make it difficult to credit that the Grawitz tumour is built of adrenal material:

(*i.*) The occurrence as a fundamental feature in the Grawitz tumour of a structure-type which is rarely seen in authentic adrenal derivatives.

(*ii.*) The much more highly malignant nature of tumours growing in the suprarenal cortex over the Grawitz tumours, as evidenced by the type of cell, the duration of course and the disseminating tendency.

(*iii.*) The sex and endocrine abnormalities that may accompany the adrenal carcinoma, but never the Grawitz tumour.

And when this evidence is added to that gained by a study of the adenomata, the conclusion is inevitable that Grawitz's theory is wrong and that the hypernephroma of the kidney is a true carcinoma of the renal epithelium.

Chronic Nephritis and New Growth.

Chronic inflammation of the kidney is an important factor in the production of both renal adenomata and Grawitz carcinomata. This is set out in Table C.

For comparative purposes three arbitrary grades of chronic nephritis have been recognized. Of nineteen adenomata, ten were accompanied by a severe, eight by a moderate, one by a mild grade of inflammation and no kidneys were free. The numerical average or nephritic index (obtained by allotting arithmetical values three, two, one to the three grades) works out at 2.5.

Among fourteen Grawitz carcinomata, three were associated with a moderate grade of nephritis, seven with a mild and four appeared to be free. The nephritic index is 0.9. The more active the tumour, the less has been the influence of chronic inflammation in its causation. The earlier adenomata have an index of 2.7, the advanced forms 2.3 and the Grawitz carcinomata 0.9. Chronic nephritis falls into line with chronic inflammation elsewhere

TABLE C.—CHRONIC NEPHRITIS AND NEW GROWTH.

Tumour.	Total Number of Cases.	Number Graded as "+++"	Number Graded as "++"	Number Graded as "+"	Number Free from Nephritis.	Nephritic Index.
Early Adenomata	9	6	3	0	0	2.7
Advanced Adenomata	10	4	5	1	0	2.3
All Adenomata	19	10	8	1	0	2.5
Grawitz Tumours	14	0	3	7	4	0.9

as an important, but not sole, factor in cancer production.

Wilson's Hypothesis.

With the collapse of the Grawitz theory a new basis for discussion has been provided by Wilson,[22] who, obsessed with the "rest" doctrine and finding Wolffian and adrenal rests in turn disproved, asserts that the Grawitz tumours must arise from rests of embryonal kidney tissue which remain undeveloped till in adult life they take on neoplastic properties.

Wilson claims that all the evidence brought forward for the renal nature supports just as strongly an origin from embryonal as from mature renal tissue. He attempts to discredit an origin from the convoluted tubules by pointing out that "frequently" a Grawitz tumour arises in an otherwise healthy young adult who presents no indication of renal inflammation. The occasional presence of round- or spindle-celled sarcoma-like areas and the blood stream route of dissemination appear to him inconsistent with an epithelial origin. A derivation from renal blastema, he concludes, "may account for the embryonic type of cells" and "suggests an explanation of their marked malignancy."

Wilson's claim merits some discussion. Wright[26] has opposed Wilson's theory, but he has fallen into the same error as Choyce[9] and credits Wilson with a theory that Wilson never made—a theory that the Grawitz tumour arises from rests of Wolffian tissue. The Wolffian rest theory was put forward by Kupffer in 1865 and has long been exploded.

It is difficult to understand why Wilson should deny to the kidney the otherwise universal tendency of epithelium to undergo a carcinomatous change in later life. He brings forward no evidence that such nephrogenic remains can persist. Usually if any portion of renal blastema fails to perfect a connexion with a ureteral outgrowth, it forms a cyst or else atrophies (Stoerk). The tendency of disconnected fragments of tissue is to atrophy. Wilson himself mentions how Wolffian inclusions in the kidney degenerate. Adrenal rests, though common throughout the abdomen in infancy, have usually disappeared in the adult (Glynn).[12] It is possible that rarely some nephrogenic blastema persists and even gives rise to tumours. In fact, I regard Case 45 of my series as such a case. A woman of sixty-six gave a history of pain and tumour in the side for six weeks and had the growth removed by nephrectomy. Microscopically (see Figure XII.) it consisted throughout of cells almost entirely filled by their nuclei and arranged in imperfect tubules. No Grawitz tumour ever adopts this structure. Comparison with Figure I. and Figure II. will show the resemblance to the tubules of the Wilms tumour and the fœtal kidney. The case described by Wohl[24] is probably of similar nature.

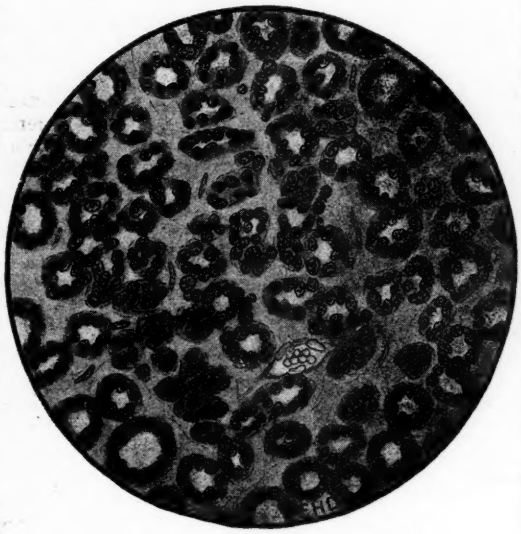

FIGURE XII..

Case 45. Age, 66. Embryonal Carcinoma of Kidney: × 500.

Wilson's suggestion will, however, hardly serve for the somewhat common Grawitz tumour. The Grawitz tumour does not occur in the young any more frequently than carcinoma elsewhere. The explanation of the path of metastases depends on the close relation of the tumour cells to the blood vessels, a relation which is much more intimate than obtains in most cancers. It is a property inherited from the secretory epithelium of the convoluted tubules which has of necessity an intimate physiological connexion with the vascular system.

In discussing the histology of the Grawitz tumour, I drew attention to the variability of the microscopic picture and the need for caution in basing conclusions on one appearance. If a search be made for sarcoma-like tissue in regions where mutual cell pressure is great, it may occasionally be found, but it is neither a common nor a typical feature. Wilson was able to demonstrate it in only two out of thirty-two cases. Adami[2] admits that, even with such a characteristically epithelial tumour as epithelioma of the skin, a careful search may reveal small areas with the histological features of sarcoma. The typical Grawitz tumour cell is a well differentiated, columnar epithelial cell with a small, not very active, nucleus.

Earlier I have shown that the grade of malignancy characteristic of the tumour is comparatively low. It may therefore be concluded that "the embryonic type of cells" and "the marked malignancy" are both misconceptions and that all the sarcoma-like properties are quite compatible with an origin from the renal tubules.

The evidence in support of an embryogenic origin is therefore extremely slender. On the other hand, there are three arguments which completely refute it:

(1) In claiming that all Stoerk's evidence was equally applicable to his own hypothesis, Wilson overlooked Stoerk's main argument, that derived from a study of the adenomata. As Stoerk did in his series, so I in mine have been able to trace the Grawitz tumour through every grade of adenoma from the cells of the convoluted tubules. This evidence, independent of any other, is sufficient to establish the tubular origin.

(2) The Wilms tumour is derived from nephrogenic blastema, the very tissue from which Wilson would derive the Grawitzian. If Wilson's conjec-

ture were correct, the two tumours should betray analogous features; on the contrary, they are utterly different, pathologically and clinically. The origin of the Wilms tumour from the nephrogenic blastema completely excludes a similar origin for the Grawitzian.

(3) It would be expected that a tumour resulting from an embryogenic disturbance would declare itself most often in early life and occur with diminishing frequence with increasing age. Such is indeed the case with the known embryonal tumour—the Wilms. Its incidence is greatest in the first two years of infancy, rapidly decreases during childhood and is negligible in the adult.

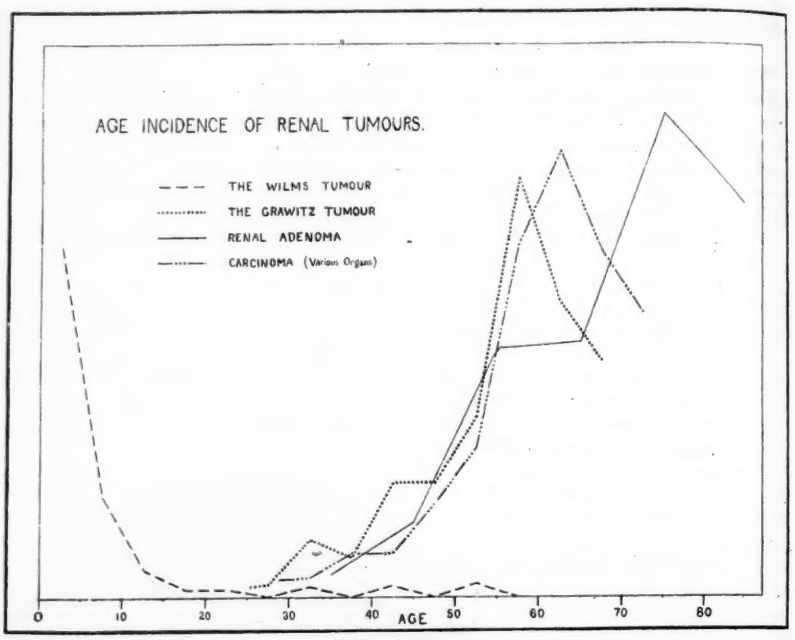

FIGURE XIII..

Figure XIII. shows graphically the age distribution of:

(*i.*) The Wilms tumour, based on Hedrén's series of eighty-five cases.

(*ii.*) The Grawitz tumour, from the combined series (one hundred and seven cases) of Albrecht, Wilson, Michaëlsson and the author.

(*iii.*) Renal adenomata, from the author's series of eighteen cases.

(*iv.*) A series of two hundred carcinomata of various organs.

The figures have been corrected for the smaller numbers of people living at the more advanced ages.

It will be seen that the last three curves behave similarly. The neoplastic liability is negligible in early life, but making itself felt about the age of forty, steadily increases thereafter. Thus the age incidence of the Grawitz carcinoma agrees with that of tumours growing from mature epithelium and is quite inconsistent with an embryogenic origin.

Wilson's suggestion throws light on an occasional atypical adult tumour, but it cannot for a moment be accepted as an explanation of the Grawitz carcinoma.

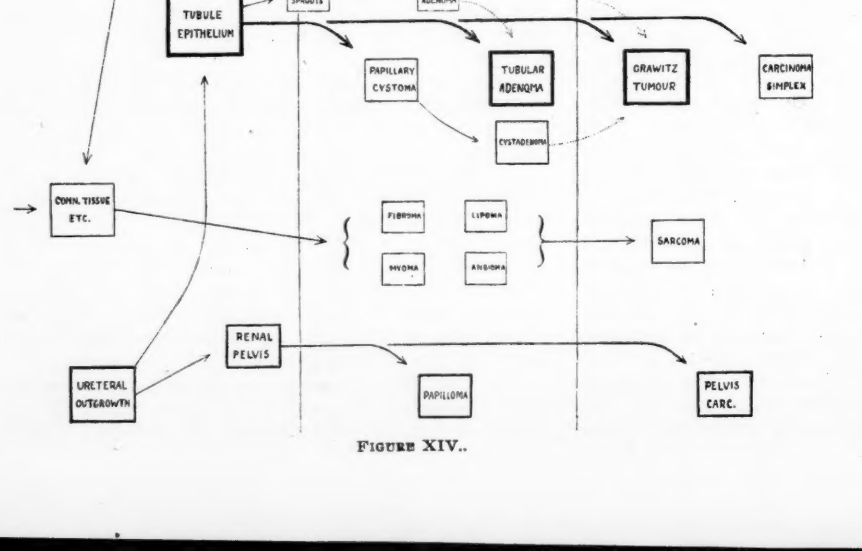

FIGURE XIV..

Classification.

Renal tumours become readily understood if they be examined on a histogenetic basis, that is, if they be classified according to the tissue from which they have arisen. The older classifications

were based purely on the microscopic appearance of the grown tumours, a method which I have already shown to be fallacious. In Figure XIV. the left-hand column indicates the normal embryology of the kidney. The greater part of the renal tubules grow from the renal blastema. The connective tissues, capsule and blood vessels are partly derived from the renal blastema and partly from ingrowing tissue. At the same time, a ureteral bud grows up from the Wolffian duct and forms the renal pelvis and the collecting or straight tubules.

The histogenesis of the Wilms and Grawitz tumours is clear. The Wilms arises from the cells of the renal blastema. The embryonal adenoma and carcinoma are of allied origin. The Grawitz arises from mature tubule epithelium and its relation to the papillary cystoma, the tubular adenoma and the *carcinoma simplex* are shown. The epithelium of the renal pelvis forms papillomata and carcinomata, papillary alveolar and squamous. From the capsule often arise tiny fibromata, fibro-myomata, lipomata and an occasional sarcoma. Wilson[23] has described two examples in adults of sarcoma of the capsule. The series of renal tumours of Allen and Cherry[5] and Hyman[14] each included an angioma. The true adrenal tumour of the kidney is merely a pathological curiosity. It is far too rare to deserve a place in a classification.

In text-books four types of renal tumours are described. As well as the infantile tumour of Wilms and the hypernephroma or Grawitz tumour, carcinoma and sarcoma are usually described. As well as the Grawitz tumour, the unmodified term "carcinoma" includes four types:

(1) Carcinoma of the renal pelvis. The microscopic appearance of the commonest variety is shown in Figure XV.. The structure is papillary, the cells narrow, elongated and set in many layers. Another variety has squamous cells, prickle cells and cell nests like an epithelioma of the skin.

FIGURE XV..
Carcinoma of Renal Pelvis: ×.200.

(2) *Carcinoma simplex* (see Figure IX.). This structure is adopted by highly malignant tumours of different origin. Some may have arisen from the pelvis, others represent the most active form of the Grawitz tumour. As a diagnosis *carcinoma simplex* is incomplete. An attempt should be made to determine the point of origin. Naked-eye inspection will often help to make it clear.

(3) Malignant adenoma or papillary adenocarcinoma (see Figure VIII.). This is the transition form between adenoma and Grawitz tumour and has already been discussed.

(4) Embryonal carcinoma (see Figure XII.).

All four fit readily into the histogenetic scheme.

Sarcoma as a diagnosis has figured in the lists with steadily diminishing frequence. Most of the so-called sarcomata occurred in infants and their embryonal origin is being more and more recognized. There remain a certain number of true sarcomata which develope from the capsule, as in Wilson's two cases, or perhaps from the connective tissue within the kidney.

Renal tumours may therefore be divided into four great groups according to their "type cells":

(1) An embryonal group of tumours which arise by a developmental error from primitive nephrogenic cells. The usual form is the mixed tumour of Wilms; less common are the sub-groups, embryonal adenoma and embryonal carcinoma.

(2) The series of epithelial tumours, including adenoma and Grawitz carcinoma, which grow from the renal tubules. They occur mainly in later life. Chronic nephritis has a more or less powerful causative influence.

(3) A heterogeneous group, chiefly mesenchymal. The majority are small, benign tumours—fibroma, myoma, lipoma, angioma; occasionally a sarcoma occurs.

(4) Renal pelvis tumours, papilloma and carcinoma.

From the clinical viewpoint the small tumours may be disregarded. The main varieties of renal tumours then remain:

(*i.*) In children the Wilms mixed tumour.

(*ii.*) In adults the Grawitz carcinoma.

Much less common are:

(*iii.*) The pelvis carcinoma.

(*iv.*) The embryonal carcinoma.

(*v.*) Sarcoma.

The histogenetic classification is all-embracing, yet simple. It is pathologically sound and may be used as a safe guide by the clinician.

Summary.

(1) The chief causes which have confused the pathology of renal tumours are (*a*) the over-emphasis laid on histological details, many of which are the result of degenerative changes, (*b*) Grawitz's hypothesis of their origin from adrenal rests.

(2) Grawitz's hypothesis is incorrect for (*a*) the Grawitz tumour may be traced through the adenomata from the renal tubules; (*b*) the Grawitz tumour is entirely different from tumours in the suprarenal gland itself.

(3) The term hypernephroma is misleading and should be abandoned.

(4) Wilson's suggestion of an embryogenic origin for the Grawitz tumour cannot be accepted because of (*a*) the adenoma series, (*b*) the Wilms tumour, whose origin excludes a similar origin for

the Grawitz, (*c*) the age incidence, which is inconsistent with an embryogenic origin.

(5) Renal tumours may be classified histogenetically in four groups, which may be reduced clinically to two main types: (*a*) the Wilms tumour and (*b*) the Grawitz carcinoma; and three less common types: (*c*) the pelvis carcinoma, (*d*) the embryonal carcinoma, (*e*) sarcoma.

Acknowledgement.

This research has been rendered possible by the care with which for many years Professor Sir Harry Allen has collected and preserved macroscopic and microscopic specimens in the Pathology Museum. For his continued courtesy and assistance and for the help and guidance of Dr. S. W. Patterson, Director of the Walter and Eliza Hall Institute, I am greatly indebted. The micro-photographs have been taken by Dr. Patterson. My thanks are due also to Dr. Leslie Hurley, Lecturer in Histology, and Dr. Reginald Webster, Pathologist at the Children's Hospital, for their assistance.

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THE TREATMENT OF RENAL TUMOURS.[1]

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Benign Tumours.

SUCH benign growths as adenoma, lipoma, fibroma and myoma of the kidney are usually small and give rise to no physical signs. These tumours are of more interest to the pathologist than to the surgeon. When, as is occasionally the case, such simple tumours grow to considerable size, the condition is clinically indistinguishable from that of a malignant tumour and a nephrectomy is performed.

Papilloma of the renal pelvis and varix or angioma of the pelvis or renal papillæ require more detailed description.

Villous tumours may occur in any part of the urinary tract and are frequently multiple. They may be confined to the renal pelvis or may be present also in the ureter and bladder. Pathologically they are divided into benign and malignant. Clinically this differentiation is not well marked. It is well known that pathologically benign papillomata may recur in a malignant form. Ewing[(1)] quotes cases in which this transformation has developed in benign tumours which appear to have existed for six, twelve and twenty-seven years. The treatment of a villous papilloma of the renal pelvis is nephrectomy and it is distressing to note that even this radical step may not cure the disease, for Battle[(2)] describes a case in which there was a recurrence in the scar of the skin incision after nephrectomy for a pathologically benign papilloma.

If these growths co-exist in the ureter and the bladder, the problem is still more formidable. If possible, nephrectomy and ureterectomy should be performed and the growths in the bladder treated by diathermy or excision.

Fenwick[(3)] has described four cases in which the condition known as essential hæmaturia was due to varix of the renal papillæ. It is not clear whether there was a vascular dilatation or a true angioma. Newman[(4)] and others report similar cases.

No single pathological entity is found invariably in these cases of essential hæmaturia and the literature is full of theories of ætiology. The condition is characterized by unilateral hæmaturia, for which there is no ascertainable medical or surgical cause.

As many an exploratory operation is performed in these cases to determine whether or not a tumour is present, it is not out of place to discuss the treatment in this paper. The kidney, when exposed, appears normal. Usually the pelvis is explored by an incision along Brodel's line. A varix of the pelvis or in a papilla may be found, as in the cases outlined above, or the cause of the bleeding may remain obscure. In two of Fenwick's cases papillectomy was successful, but in the others a secondary nephrectomy was necessary. Other writers have reported that the bleeding has ceased after a simple

[1] Read at a meeting of the Victorian Branch of the British Medical Association on May 3, 1922.

nephrotomy. This can only be explained by the occurrence of thrombosis and cicatrization following the operative trauma. Payne[5] states that nephrotomy has never failed to relieve the patients in these cases. This is incorrect. I have seen a case of recurrence after nephrotomy and many similar cases are reported. Levy[6] has recently investigated a series of thirty cases of essential hæmaturia and has been struck by the frequency of cessation of the hæmorrhage after distension of the renal pelvis for the purpose of taking a pyelogram. Braasch first suggested that these cases should be deliberately treated by distension of the renal pelvis. Levy found that the results were at least as good as in patients treated by operative methods other than nephrectomy.

Eight years ago I examined two patients with hæmaturia without any urological signs. In both cases the pyelogram appeared normal and in both the bleeding ceased after the pelvis had been injected with collargol in order to obtain a pyelogram. One patient has had no hæmaturia since. In the other hæmorrhage recurred six months ago. A nephrotomy was done and a number of petechial areas were seen in the mucous membrane of the pelvis. One of these was excised and the kidney sutured. The convalescence was interrupted by a urinary fistula which persisted for ten weeks. The kidney became infected and, though as yet there has been no recurrence of hæmaturia, there is still some pyuria. In this case the hæmaturia was very profuse and had caused a marked secondary anæmia. The general health of the patient has been further impaired by the infection and, if the hæmorrhage recurs, a nephrectomy will be a difficult and dangerous procedure. I was influenced in this case by the reports of the success following nephrotomy. In the light of later knowledge of the inaccuracy of these reports, I regret that I did not perform a nephrectomy.

In essential hæmaturia spontaneous cessation of the bleeding occurs frequently and the general health is often not materially affected by the loss of blood. In cases in which the anæmia is not marked, in which no urological signs are present and there is no renal enlargement seen in the skiagram, it is wiser not to operate. In such cases renal distension may prove useful in stopping the bleeding. The patient should be kept under observation and if signs of impairment of general health owing to the hæmorrhage should be apparent, a nephrectomy is indicated.

A nephrotomy is not a certain cure, involves a tedious and at times dangerous convalescence and may have to be followed by a secondary nephrectomy with all the difficulties and dangers of this operation.

Malignant Tumours.

The renal sarcoma of infants is a most fatal disease. The operative mortality was stated by Butlin to be 60%. Walker, in a review of a later series of cases, gives the immediate mortality as 36.4%. The proportion of cures is variously given from 5% to 10%. The only treatment is nephrectomy. This is usually performed by the abdominal route. Owing to the absence of pain due to the extraordinary freedom of the ureter from invasion, the patients do not come for treatment until the tumour has attained a considerable size; in an infant sufficient space cannot be obtained by the lumbar incision.

Malignant tumours of the kidney in adults vary in type and in site, as has been explained by previous speakers.

If a careful search for evidence of secondary growths prove negative and the kidney on the other side be functioning adequately, a nephrectomy should be performed.

The functional test upon which I rely, is the injection of four cubic centimetres of a 4% solution of indigo-carmine. This injection is given immediately before the introducton of the cystoscope. A local anæsthetic is used, because there is better secretion of urine than is the case when the patient is narcotized. In a normal kidney the efflux is deep blue in colour in five minutes. I have compared this colorimetric test with the urea test in the same patient at the same time and have found that there is close similarity in the results.

Another wise precaution before operating on a tumour of the kidney is the selection of a suitable blood donor. There may be considerable loss of blood during the operation and the anxieties of the surgeon are appreciably lessened if he knows that this can be immediately counter-balanced by a transfusion.

Technique of Nephrectomy for Renal Tumour.

The kidney may be approached by (*i.*) the lumbar route, (*ii.*) the abdominal route, (*iii.*) a combination of these two routes.

The lumbar route is preferable in all but very large tumours. "The kidney is an extra-peritoneal organ and ought to be attacked from behind and not across the peritoneal cavity."—Morris.

The chief advantages urged for the abdominal route are that the lumbar incision does not give enough room, that the renal pedicle can be ligated before the removal of the kidney and that the condition of the other kidney can be investigated.

The lumbar incision can be prolonged downwards and forwards in such a way that adequate exposure is obtained, even for large tumours. Preliminary ligation of the pedicle is not always possible, even through an abdominal incision, owing to overlapping of the tumour. The condition of the other kidney can be more accurately determined by modern methods than by abdominal palpation.

Some of the disadvantages of the abdominal incision are the risk of implanting malignant cells in the peritoneum by rupture of a soft tumour, the risk of impairing the vitality of the colon, the difficulty of keeping the intestines out of the way and the increased risk of hernia.

The lumbar route provides better drainage and gives better access to the upper pole of the kidney, where vascular adhesions are often most troublesome, and it interferes less with important structures. Some surgeons advise an abdominal incision in order to search for secondary growths in the peritoneum and to ligate the pedicle. A lumbar incision is made, through which the kidney is separated. It

is then removed through the anterior incision. I think the lumbar incision is preferable for all but very large tumours.

Technique of Lumbar Nephrectomy.

Possibly more different incisions have been described in the lumbar region than in any other part of the body. Vertical, oblique, transverse and triangular incisions have been described. I prefer an incision at the outer border of the *erector spinæ* which begins well above the last rib and passes vertically to a point 2.5 centimetres above the crest of the ilium. If more room is required the incision is prolonged in an oblique direction downwards and forwards. In all but the most simple and easy cases the last rib should be removed sub-periosteally. The loss of the rib produces no functional disability and makes the delivery of the kidney much easier. The last dorsal and ilio-hypogastric and ilio-inguinal nerves can often be avoided. If divided, they should be sutured at the end of the operation. As much of the peri-renal tissue as possible should be removed with the kidney. In large tumours of the type known as hyper-nephroma, this tissue contains large veins which should be ligated when seen, for a long, heavy forceps sometimes tears off the vein, which may be difficult to pick up.

The pedicle should be isolated by the fingers after the ureter has been isolated, divided by the cautery and ligated. The clamp is applied to the pedicle at some distance from the kidney hilus, if possible, so that when the pedicle is divided there is a portion remaining on the renal side of the clamp. A ligature is then placed proximal to the clamp and the vessels separately ligated in the groove made by the clamp. This step is made easy if the pedicle is divided as described above.

In one case I found a double renal pedicle, one limb of which was not secured before division, with the result that the loss of blood was greater than was desirable.

In cases of carcinoma of the renal pelvis the pedicle is usually infiltrated by the growth. In such cases it not infrequently happens that the forceps on the pedicle slip off and the vessels retract into the depths of the wound with alarming hæmorrhage. If such an accident should occur, it is very unwise to attempt to catch the pedicle in a clamp until it can be seen. Mayo[7] has pointed out that the easiest way to control the hæmorrhage is to feel for the pedicle with the fingers, which are guided to the spot by the pulsations of blood from the renal artery. The veins are tied to the artery by the infiltration and are thus simultaneously controlled. The pedicle can then be ligated or clamped. Neglect to observe this rule may lead in operations on the right side to injury to the duodenum or *vena cava*. The duodenum forms a ventral relation of the renal hilus and several cases have been reported in which a clamp applied to the pedicle has included a portion of the duodenum, with the result that a fatal duodenal fistula has developed a few days after the operation. Mayo suggests a transperitoneal attack on the duodenum in these cases before the patient becomes exhausted. The duodenum should be lifted from its bed, the opening sutured and covered with a flap of peritoneum or omentum, then a jejunostomy should be performed for temporary feeding purposes.

Abdominal Nephrectomy.

This is best performed through an incision in the *linea semilunaris*. The incision sometimes advised in the mid-line does not give such good access. The colon is mobilized and pushed towards the mid-line. The renal pedicle is then secured and the kidney removed. Drainage should be through a stab wound in the loin.

The prognosis of renal tumours after removal is bad. Recurrence usually occurs within a year. It is possible that the outlook will be improved by the aid of modern methods of X-ray therapy.

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Reports of Cases.

A CASE OF SPRUE IN NEW SOUTH WALES.

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THIS case is being reported because some time ago the occurrence of anchylostomiasis on the Tweed was doubted until the recent investigations by the officers of the Australian Hookworm Campaign proved its prevalence, despite the assertions of the local medical men that the disease existed here. It is therefore important to know the southern limit of all tropical diseases.

The present case is the first I have seen in twenty-five years' practice on the Tweed River. Since then I saw another case similar as regards the presence of a persistent sore tongue. The last one, however, cleared up on a milk diet and has not recurred to date.

I may add that the patient to whom the following notes refer was shown at the last meeting of the North-Eastern Medical Association and all present concurred in the diagnosis.

Miss A.B. is aged twenty-five years. Both her parents are alive and healthy, except that her mother is subject occasionally to some gastric disturbance. She is one of a family of seven, of whom six are alive and well. The other was still-born at full term (craniotomy). The patient has assisted in the dairy and the house work.

Past Illnesses.

She had measles and pertussis in childhood and suffered from anæmia till fourteen years of age. She has had influenza three times. The last attack occurred two years ago; it was severe.

Present Illness.

Three years ago the patient first complained of persistent soreness of the tongue, mainly along the right side. At this time she had also localized tenderness in the epigastrium and pain soon after food. I treated her for gastric ulcer, but expressed the opinion that, had there been any looseness of the bowels, I should have suspected sprue.

She was kept on a milk diet for seven weeks and improved as far as the tongue was concerned, though she did not get quite rid of the soreness. Her stomach symptoms disappeared.

Six months later (*i.e.*, two and half years ago) the tongue got worse again and diarrhœa set in. These symptoms have continued at intervals until I saw her on March 7, 1922. She had not been back to me since the attendance three years ago.

I might mention that she had been at Gympie, Queensland, in 1916 for five weeks. She has also been in Queensland since the onset of the disease, *viz.*, in 1921, when she spent four months at Maryborough and four months at Barcaldine. During her stay at Barcaldine the diarrhœa improved and she gained 12.7 kilograms (two stone) in weight.

Present Condition.

She is a well developed young woman, weighing when first seen on March 7, 1922, 81.2 kilograms (12 stone 11 pounds). Her temperature, pulse and respirations were normal.

The tongue is denuded in patches of its epithelium along the sides, dorsum and tip. These denuded areas are reddened and tender to the touch and cause great pain on eating any sapid food. Similar patches occur along the cheek pouches and inside the lower lip.

The fauces are reddened, as also is the extreme posterior part of the soft palate.

She complains of a burning pain beneath the sternum and of diarrhœa. The diarrhœa is of a peculiar character. It occurs only in the forenoon and is profuse, frothy, grey-coloured and evil smelling. There is no pain connected with defæcation, no tenesmus, no straining. Before the stool there is some fullness and soreness of the abdomen, which is relieved by the defluxion.

The burning pain beneath the sternum occurs after taking food and sometimes there is epigastric pain as well.

The urine is normal in all respect. The uterus is retroflexed and retroverted. Hæmorrhoids are present.

Note on April 24, 1922.

Since March 7, 1922, she has lost 4.5 kilograms (ten pounds) in weight; but some of this is due to the difficulty of inducing her to take sufficient milk while on an exclusively milk diet. The diarrhœa had quite disappeared and also all signs of digestive disturbance, but the tongue condition, though much improved, is still far from cured.

Treatment.

She has had the usual sprue treatment, exclusively milk diet and at intervals santonin, 0.18 gramme (three grains), in 3.5 mils (a drachm) of castor oil for six successive days. At first she had also a bismuth mixture.

At present she is taking potassium chlorate in tablets and is washing out her mouth four or five times a day with eusol.

For the past fortnight she has been allowed bananas, at first one a day, but later two, as she increased her milk. She is now taking three daily.

Reviews.

THOMAS ANDERSON STUART.

IN our issue of March 13, 1920, we endeavoured to give our readers a sketch of the life and work of Sir Thomas Anderson Stuart, but now we greet the publication of a volume which is based on the account prepared by the professor himself, amplified by notes dictated by him during his last illness, completed from abundant memoranda left by him and finally revised, shortened within printing limits and edited by his friend and amanuensis, Mr. William Epps, the Secretary of the Royal Prince Alfred Hospital.[1] The necessity for curtailment and the allowance of only three months for editorial work caused Mr. Epps great concern and in the preface fear is expressed lest balance, continuity and smoothness may have suffered. However that may be, we have here the record of the life work of a great man, soberly and carefully set forth.

The story opens with the quiet, studious life of the only child of the family in Dumfries, the early education, the apprenticeship in pharmacy, the preparations for the entrance examination to the Medical School of the University of Edinburgh, including a stay at the *Gymnasium* in Wolfenbüttel. The years fly by, with an accumulating record of academic honours, crowned at the baccalaureate stage by the Ettles Scholarship and gold medal as the most distinguished graduant of the year in the University. He had been dresser to Spence and had won the medal in Lister's classes. Visiting London, he passed the primary examination for the fellowship of the Royal College of Surgeons with unusual distinction. Already feeling his vocation as a teacher, he went to Strassburg and studied physiology and chemistry under Hoppe-Seyler, experimental physiology under Goltz and experimental pharmacology under Schmiedeberg, *inter alia* completing researches into the action of salts of nickel and cobalt, which helped to gain him the degree of doctor of medicine with gold medal on his return to Edinburgh. He now became Demonstrator of Physiology and assistant to Rutherford, a post which he had accepted before going to Strassburg.

He had the advantage of watching the transfer of the Medical School to the Meadows and of assisting Rutherford in planning the fittings of the new buildings. But after only one year of work under Rutherford he was appointed Professor of Anatomy and Physiology at the new Medical School of Sydney, where he arrived at the end of March, 1883.

Not yet twenty-seven, a stranger in a strange land, with only two years of special training, he takes upon him the task of devising, building and staffing a great medical school.

The University of Sydney was established by Act of Parliament in 1850 and the inaugural ceremony took place in October, 1852. The creation of a Medical School was contemplated from the outset and power was taken to confer medical degrees. Dr. John Smith, the Professor of Chemistry and Physics, was made Dean of the Faculty of Medicine and a board of eight examiners was appointed, degrees being conferred on practitioners after report from the board. The Great Hall was opened in July, 1859, but the three early professors opposed progress with plans for the Medical School. New professorships were gradually established and the timorous spirit disappeared. The Senate from the first contained a strong representation of medical graduates, including Sir Charles Nicholson, M.D. (Edin.), Dr. Douglass, Professor Smith, M.D. (Aber.), Richard Greenup, M.D. (Cantab.), and B. A. O'Brien, M.D., while Wentworth was son of a surgeon. In 1873 thirteen acres of university land were given for the establishment of the Prince Alfred Hospital, which was inspired and ruled by Sir Alfred Roberts till his death in 1898. The hospital was opened in 1882 with only two wards complete and no administration block. A conjoint board, representing university and hospital, administered the appointment of the staff. Meantime, events had rapidly matured. In 1880 the University endowment was still only £5,000 a year, but now the great Challis Bequest was announced, though not actually received till some years later. The Government granted an additional endowment of £5,000 a year. A medical curriculum was adopted, including one year of arts and four years of medical studies, and the foundations were laid of a four-roomed cottage to serve the purposes of the Medical School and the Department of Biology.

Under such conditions Anderson Stuart began his work with four students in 1883. The cottage was rapidly completed, biology was transferred elsewhere and three rooms added. In 1885 plans for a splendid new Medical School on a large scale, in harmony with the main buildings, were prepared by Mr. James Barnett, Colonial Architect, and, through the insistent advocacy of Professor Stuart, Parliament was induced to vote £80,000 for the purpose. In 1886 there were only thirty-nine medical students, of whom twenty entered that year. In 1887 the building was in progress and characteristically the foundations were

[1] "Anderson Stuart, M.D.," by William Epps; 1922. Sydney: Angus & Robertson, Limited; Demy 8vo., pp. 177, with sixteen illustrations and four cartoons. Price: 21s. net.

carried far beyond the immediate work, so that ultimately another £40,000 was provided to complete the School. About 1890 the building was completed as far as the primary vote permitted and in the same year the Chair of Physiology and Anatomy was divided, Anatomy passing under the control of Professor Wilson, who had become Demonstrator in 1887. Within this marvellous period of seven years (1883-1890) the curriculum had been made more practical and had subsequently been converted into a five years' medical course, which endured with little change for fifteen years. The quality of the teaching in these early days is vouched for by the graduates of the time, including such men as Mills, Hinder, Purser and Maitland. To show the acuteness of Professor Stuart in the choice of his assistants, it is only necessary to mention Alexander MacCormick, Wilson, Almroth Wright, C. J. Martin and Chapman. To prove his foresight one need only point to the existing Medical School of the University of Sydney, with 857 students in 1919, with classes outgrowing the accommodation which seemed almost ludicrous in 1890.

In 1901 Stuart become Secretary of the Prince Alfred Hospital and on the death of Sir Edward Knox succeeded him as Chairman of the Board. The number of occupied beds was 236 and it was already arranged to ask Parliament for £40,000 to erect two new pavilions. In the enthusiasm for a memorial of Queen Victoria and in view of the visit of His Royal Highness the Duke of Cornwall and York, Parliament was induced to vote £40,000 and subsequently further sums, so that in 1905 provision had been made for 500 beds, with new operating theatres, lecture hall, dispensary, etc.. The Administration Block was remodelled and in 1911 the housing of nurses was taken in hand, with provision for a staff of 216. Subsequently Stuart's work in the hospital, now the Royal Prince Alfred Hospital, was mainly administrative; but this time of relative quiet included the establishment of the venereal clinic and now plans are prepared for venereal disease wards for thirty-two women and children and for 800 to 1,000 out-patients. The Department of Pathology has been reorganized with Dr. Tebbutt as Honorary Director and many other important changes have been made. Mr. Epps remarks, however, that at the time this memoir was written the hospital was still one of 392 beds as far as the State Government is concerned, the remainder being occupied by returned soldiers under agreement with the Federal authorities.

The Sydney Hospital also became a Clinical School in 1909 and an attempt was made to include St. Vincent's Hospital also.

Public health presented another field for Stuart's activities. In 1891 he became a member of the Board of Health and at the end of the following year he was appointed Government Medical Adviser and President of the Board in succession to Dr. Norton Manning. Land was reserved for Chemical and Bacteriological Laboratories. Sir George Reid handsomely acknowledged Stuart's help in the principal health legislation of the time. A *Noxious Trades Bill* was passed, Stuart strongly opposing the removal of the trades to La Perouse. Inquiry was conducted into the Government charitable institutions. Much other useful work was done, but in 1896 Stuart retired from the chair, as he refused to leave the University and give his whole time to the Department of Health. He continued, however, to be a member of the Board.

Space does not permit any detailed presentment of his other labours, including in the University his constant work as member of Senate, Dean of Faculty, teacher and examiner, his assistance in the establishment of other professorial chairs, such as pathology, pharmacology and medicine, his interest in promoting the Schools of Dentistry and Veterinary Science, in the development of massage, in the establishment of an Institute of Tropical Medicine and in many other important movements. Reference, however, cannot be omitted to his work in the Royal Society of New South Wales and his illuminating addresses when twice elected President, his services in the sessions of the Medical Congresses of Australasia, his zealous cooperation in the arrangements for the coral-boring operations at Funafuti, particularly in the third expedition under Dr. A. E. Finckh, or his fruitful visits to Europe, for instance, in 1890, when he reported so fully on Koch's tuberculin treatment.

For details concerning these and other matters, we can only refer our readers to the work under review. Throughout there is present the picture of a man of high ideals, of clear insight, of sound judgement, of untiring industry; a man of marvellous pertinacity and driving power, skilful to adapt means to ends, quick to grasp each favouring opportunity. Hence the speed with which each great proposal was realized. He has left monuments of his labours in the Medical School of the University of Sydney and in the Royal Prince Alfred Hospital. His bust in the main hall of the Hospital, his portraits in the Great Hall of the University and in the Sydney Art Gallery, speak of recognition in the scene of his life work, while many degrees and distinctions from universites and learned societies and the knighthood conferred in 1914 attest high appreciation elsewhere. But his greatest memorial is in the characters, the attainments, the living energies of the hundreds of men trained under his influence. The final picture is that of the man in plenitude of his powers, stricken with fatal disease, steadfastly and courageously working on until the end and leaving behind him an example that should be a lasting inspiration.

FIELD AMBULANCES.

DR. HARDIE NEIL, late Officer Commanding No. 3 New Zealand Field Ambulance and creator of "The Kiwis" mirthmakers and morale maintainers, has written a book of little more than one hundred pages entitled "Field Ambulance Organization and Administration" that is sure to be received by members of the Army Medical Corps with enthusiasm.[1] The text is clear and brief; it contains a wealth of information which will enable anyone who follows carefully, to be sure of success. As an example of condensed practical directions, summarizing ripe observation and experience, it is admirable and quite worth while.

This book is written with a view to assist the civilian practitioner to adjust his outlook to the necessities and complexities of modern warfare. From a mass of orders and regulations the author has isolated active principles and discarded non-essentials. In making these selections he has acted on his own judgement, as a reliable guide must, and has succeeded in placing before the reader the problems to be solved and the objects to be attained, together with the methods of attaining them in a lucid, logical and interesting manner. Experts may cavil at the small space allotted to their particular hobbies, but for general purposes it is a well-balanced compendium of medico-military knowledge. It opens the magic door to a fascinating world peopled with Assistant Directors of Medical Services, Deputy Assistant Directors of Ordnance Services, Officers in Command, Section Commanders, Quartermasters, Sergeant-Majors, Wardmasters, Bearers, *et hoc genus omne*, whom we soon learn to know and meet on friendly terms. War has been aptly defined as "periods of intense fear alternating with periods of intense boredom." The medical officer who masters the art of military organization and administration, need never be bored. The study is of profound interest and inestimable benefit. Thorough training and discipline are essential in field ambulance work. The smart, well-drilled man with a pride in himself and his unit is the contented, reliable man. Coordination and *esprit de corps* spell efficiency and for sound team work the leaders must undergo careful preparation.

The contents are divided into chapters dealing with the various phases of field ambulance activity, including training, interior economy, supplies, duties of personnel, establishment of dressing stations and rest stations, with comprehensive appendices.

There will be many who will welcome a later edition, with the scope widened to include a fuller discussion by an author who is at once stimulating, resourceful and convincing.

[1] "Field Ambulance Organization and Administration," by Lieutenant-Colonel Jas. Hardie Neil, N.Z.M.C.; 1919. London: H. K. Lewis & Company, Limited; Crown 8vo., pp. 125, with diagrams. Price: 4s. 6d. net.

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Morbid Anatomy and Surgery.

IN the opening paragraph of his admirable study of the pathogenesis of renal tumours, Dr. E. H. Derrick quotes from the writings of a well-known American surgeon words which, if generally applicable, would indict and convict the practice of surgery of a scientific offence of the gravest nature. It is suggested that accurate knowledge of the nature of certain neoplasms is indispensible to the surgeon, since his function is to regard malignant tumours in two classes, those which he can remove and those which are out of his reach. While the pathology of malignant disease remains obscure and its rational treatment consequently impossible, surgical removal of the growth, even if it involves a considerable degree of mutilation, is justifiable. It must, however, be recognized that this method of treatment is unsound and has the added disadvantage that, even when a cure of the disease is effected, greater or less physiological injury must result from the interference. The fact that in the vast majority of instances malignant tumours lead to death unless removed at an early stage provides the justification for operative treatment. The same fact impedes the trial of other empirical methods of treatment in the early stage and prevents their use to a considerable extent. Fortunately, surgery is not composed merely of crude mechanical methods. The surgeon is not or should not be a human carpenter, interested only in the skilled use of his tools. His practice must be based on knowledge acquired by observation in the clinic, in the *post mortem* room and in the laboratory and he may not forget for one moment that ideal treatment of disease is the removal of the cause and the complete restoration of the functions of the affected parts. The surgeon handles the material to be studied and his responsibility is not discharged when he has done all that can be done at the present time to save his patient's life. His interest in morbid anatomy, in bacteriology and protozoology, in bio-chemistry and bio-physics cannot remain passive, nor is he justified in signalizing accurate knowledge as academic, merely because his wit and that of his contemporaries are too dull to appreciate the significance of that knowledge.

Dr. Derrick regards the reproach of the surgeon to the pathologist as justified, but in doing so he has apparently overlooked the fact that it is one of the functions of the surgeon to investigate the diseases he is called upon to treat. In the case of tumours of the kidney confusion has arisen largely because the microscope has been used with too little discrimination and hypotheses based on slender foundations have been accepted without critical control. The student of morbid anatomy is usually an embryologist and a pathologist as well. If the practitioner with clinical experience will collaborate with him, there should be no tendency to confuse issues or to attach importance to minor points. Dr. Derrick has had access to a collection of specimens and microscopical sections prepared with circumspection and skill by Professor Sir Harry Allen. The essential clinical data have been attached to the majority of the specimens. He has further taken advantage of the work done by competent observers in various parts of the world. Thus armed and equipped for serious research, he was able to attack the problem in a logical and scientific manner. For a considerable time the true nature of tumours called hypernephromata has been questioned and the hypothesis of Grawitz has been found wanting. Dr. Derrick has introduced order in the differentiation of growths arising from the specialized renal epithelium. It will be noted that he has no place for the rare adrenal tumour of the kidney in his classification. Surgeons should find his description of the origin and type of each of the common renal tumours of immediate value in diagnosis and treatment. It is probable that at a later date, when more is known of the bio-chemical characters of malignant growths, histological and histogenetic distinctions may be coordinated with these characters. At first sight this appears to be a laborious and tedious method of ascertaining the nature of these malignant growths, but since short routes invariably lead to the unconscious assumption of something that is not true, it is, perhaps, the sound-

est means for studying the pathology. Dr. Derrick's work is all the more valuable since it is devoid of that dramatic quality which inevitably attaches to the elaboration of a theory of the causation of cancerous tumours or the suggestion of a new method of treatment. Surgeons and others whose chief function is to treat disease, will contribute more to knowledge if they will work out a single ascertainable fact in connexion with this disease, than if they try to cover the whole range of subjects involved in the ætiology of cancer and to solve a problem that has baffled the whole world for so many years. They should work hand in hand with pathologists and bio-chemists, so that their work may not suffer from lack of special skill in laboratory experiment and by reason of the limited training in difficult branches of science. Much patience is required in the endeavour to prove one small point; the worker must be prepared to meet rebuff and failure time after time without becoming despondent; he must be on the alert to discover defects in his own reasoning and imperfections in his technique. The surgeon should be the first to recognize the necessity of well-planned research into obscure points of pathology and should be anxious to take a small part in these researches. Dr. Derrick has unknowingly demonstrated that the reproach delivered by the surgeon to the pathologist must recoil on the former.

THE HEALTH OF THE WORKER.

THE SERVICE PUBLICATION recently issued by the Department of Health of the Commonwealth on the scope of industrial hygiene marks the dawn of an era. Hitherto, with few exceptions, the interests of the worker in Australian industries has been of the kind spoken of as economic. The trades unions have sought with conspicuous success to lighten the burden of the worker. Short hours of labour have been secured in order that men might enjoy leisure and recreation and might devote time to domestic affairs. The advent of the eight-hour day meant much for the man who formerly spent his physical strength in continuous and exhausting work. Wage-earners engaged in clerical occupations, as well as those who performed manual work, benefited greatly by the restriction of the hours of labour. It was found that it was possible in the majority of callings for a man to perform a greater value of work in forty-eight hours a week than he could if required to work for fifty-five or sixty hours. Moreover, it was recognized by employers as well as by the employed that human beings had a right to relaxation and recreation within reasonable limits. Sociologists condemned an industrial undertaking which derived its profits from the sweating of the employees and public opinion supported the demand of the workers for definite hours of rest as well as definite hours of work. The soundness of the principle underlying the eight-hour movement is not impaired because extremists have endeavoured to curtail hours of labour and the amount of production until the industries can no longer be maintained as business undertakings. The hygienic aspect of short hours of labour is even more important than the economic or social. The trades unions have touched on this problem from time to time, but have not attacked it scientifically or logically. The Department of Health has set up a slogan: "No industry may injure the worker!" This principle can only be applied if the worker is protected during his hours of labour and if he undertakes to use his hours of leisure wisely and with discretion. Industrial hygiene is useless if the worker after eight hours of protected employment spends the following hours in a stuffy apartment drinking. Good wages are valueless if the money is spent on gambling, alcohol, evanescent amusements and unhealthy pursuits. The physical, moral and economic benefit to be derived from regulated labour dissipates if the worker is unprepared to play his part in the great movement of emancipation. Freedom devoted to vice is more soul destroying than the worst form of slavery.

The science of industrial hygiene and preventive medicine has the objective of regulating labour so that risks may be eliminated, so that the work each man has to perform may be adapted to his physical and mental abilities and powers and so that the industry may be furthered while the health, comfort and strength of the worker are maintained at a high level. The scope of industrial hygiene as set forth by Dr. D. G. Robertson is so wide and embraces so many new problems that it is impos-

sible at present to predict the extent of assistance that will be required of the medical profession in its development. In the United States of America the movement has advanced a short distance. In Great Britain the work has been developed in certain directions during the course of many years. But neither in the old country nor in the great republic on the other side of the Pacific have the problems been probed to the bottom. It is a matter for congratulation that the Commonwealth Department of Health has secured the services of an American expert, Dr. A. J. Lanza, to assist in the initiation of the scheme. The establishment of a research branch is an earnest that the authorities intend to take their duties seriously and purpose to investigate every problem concerning the health of Australian workmen and the risk associated with various trades.

The medical profession will note that the Division of Industrial Hygiene encourages the establishment of medical services in industrial undertakings with a medical practitioner in charge. It will further be noted that it is held to be the duty of the employer to satisfy himself that his employees receive suitable and skilled treatment when injured in the course of their employment or when suffering from illness directly or indirectly associated with that employment. The principle is so sound that no one can possibly raise an objection to either proposal. But it will be necessary for the medical profession to consider the machinery that will have to be created for these purposes and to ascertain what part the general practitioner will be called upon to play. If the health of the worker is to be properly safeguarded, of necessity there will have to be a certain amount of cooperation between the trained expert in industrial hygiene and the family practitioner. The latter will have to render services more or less controlled by the medical adviser of the employer, who is morally, if not legally, responsible for efficient treatment. In warfare the injured or otherwise disabled soldier has to be restored to health as rapidly as possible in order that the fighting strength of the force may be maintained at a high level. In the industrial world, the disabled worker has to be restored to health rapidly in order that the productiveness of the industry may be maintained at a high level. The medical officer in the Army recognizes the right of the soldier to have the advantage of modern science to assist him to recover rapidly and completely. In industry the practitioner must be prepared to collaborate with others in the interests of the individual. The recognition of the essential problems of industrial hygiene by the medical profession will lead to the elaboration of a scheme of cooperation. It would be advisable if this scheme were considered at an early stage of the development of this movement, so that friction, such as that which appeared when national insurance was introduced in Great Britain, might be avoided. Moreover, there is still much to be learned in this branch of medicine and the sooner the general practitioner makes up his mind to participate in the learning, the better it will be for him and for his patient, the worker. This work is essential for a powerful and prosperous Commonwealth.

THE MECHANISM OF THE PRODUCTION OF SHOCK.

PHYSIOLOGISTS, physicians and surgeons have had their attention forcibly drawn to the subject of surgical shock during the war. A large amount of clinical observation and experimental work has been conducted in the endeavour to ascertain the true nature of surgical or secondary shock. Facts have been accumulated, but not in so ordered a manner that clear deductions can be drawn. Unfortunately, much of the laboratory evidence has to be refused or at best registered with reserve on account of the failure of the experimenters to reduce the number of the variable factors to a minimum. Contradictory findings have led to speculation and speculation in science is a dangerous basis for discussion. In the first place, there is an initial difficulty in arriving at an acceptable definition of shock. Bayliss's definition is too little concrete to admit of its application in the laboratory. Even in the clinic it is by no means easy to identify with certainty the peculiar form of depressed activity of bodily functions which frequently follows severe injuries or loss of blood. Moreover, since shock is associated with a lowering of blood pressure, dulled sensibility and an altered distribution of the blood within the body, it does not follow that all the bodily functions are necessarily in a state of depressed activity. The heart may be quite unaffected. It must therefore be admitted that there is still considerable confusion concerning the mechanism of the production of secondary shock. Of the numerous hypotheses put forward, those in which exhaustion of the vaso-motor centre, cardiac failure. an acid intoxication and a severe reduction in the carbon dioxide in the blood are regarded as the primary factors, may be refused as untenable. They have all been met by insuperable objections. The

suggestion that in shock the results of the physiological action of either histamine or of a substance possessed of identical biological effect are involved, is highly ingenious and is not readily disproved. It would have to be assumed, if this were the cause of shock, that the trauma either produced a disturbance of the endocrine glands and particularly of the pituitary gland or that extensive destruction of muscle is essential. In support of the hypothesis that there is an extensive disturbance of the normal coordinated action of the glands of internal secretion the fact has been put forward that lowered blood pressure is the most evident sign of shock. This would seem to point to a disturbance of the adrenal glands. Some observers have claimed that there is in the blood a diminution of the quantity of adrenalin, while others maintain with much emphasis that there is an increase. Adrenalin is recognized by means of the biological test. Physiologists are not unanimous in regard to the function performed by the secretion of the suprarenal capsules in the maintenance of the normal blood pressure. There would seem to be a difference between the introduction of a measurable amount of suprarenal secretion into the blood stream and the maintenance of a normal adrenalin content of the blood. It is conceivable that the suprarenal secretion might govern the height of the pressure when present in such small quantities that the action of a sample withdrawn would be too small to be registrable. The suggestion has also been made that the suprarenal secretion acts only when the other factors in the maintenance of a normal pressure prove inadequate. In any case the normal adrenalin content of the blood is probably very low and very little information can be obtained by endeavouring to estimate the increase or decrease of this substance in the blood in the condition of shock.

In these circumstances it is of considerable importance that Dr. Arnold Rice Rich has made some extremely careful studies of the relation of the suprarenal capsules in artificially produced shock.[1] His experiments were conducted with a full recognition of the work carried out in other parts of the world and with an appreciation of the need of clear-cut issues. He used apparently healthy, full-grown cats. In each instance the animal was anæsthetized with ether under standardized conditions, the same rate of delivery and amount of ether being employed in every experiment. As soon as the cat was insensible, tracheotomy was performed and a cannula was fixed in the carotid artery, so that regular blood pressure records could be taken. The abdomen was opened and the intestines exposed. The gut was then firmly pinched from the duodenum to the caecum. This procedure occupied from thirty to forty minutes. The blood pressure fell abruptly during the first five minutes; then, often after a temporary rise, the pressure gradually sank to sixty millimetres of mercury or lower. The other signs of shock became apparent. The symptoms of shock appeared on an average one hour and fifty minutes after the commencement of the experiment. This development was remarkably regular.

[1] *Bulletin of the Johns Hopkins Hospital*, March, 1922.

In the next series of cats, both adrenals were removed through lumbar incisions and the wounds closed before the abdomen was opened. Up to this time no definite change of blood pressure was recorded. At the end of one hour the abdomen was opened and the intestines pinched as before. No fall followed beyond that experienced in normal animals kept under ether anæsthesia for two and a half hours. Dr. Rice recognized that this result might be due to the withdrawal of suprarenal secretion, but that it was essential to carry out a control experiment before such a conclusion would be justified. He therefore kept a series of animals anæsthetized for one hour without removal of the adrenals and then proceeded to manipulate the intestines as before. In these animals, too, there was no fall in blood pressure and no other signs of shock. When the adrenals were removed from seven to seventeen hours before the experiment and the original scheme followed, shock developed within thirty or thirty-five minutes. At the beginning of the experiments all the animals were active and not asthenic, but the blood pressure was usually about eighty-two millimetres of mercury. The pulse-rate was rapid. Dr. Rice realized that this pressure level at the beginning of the experiment vitiated the results. He therefore repeated the series, but exposed and manipulated the intestines one hour after the adrenals had been removed. The blood pressure in these cats had not begun to fall, but the animals had recovered from the anæsthetic and reacted normally to stimuli. Shock appeared in these animals in forty-five minutes, just as it did in normal animals. He therefore concludes that shock can develope in the absence of the suprarenal capsules exactly as it does in normal animals. He cannot believe that the removal of the both glands, confirmed *post mortem*, can be compensated in every animal by a vicarious action of accessory chromaffin tissue. He has been able to show that cardiac failure does not occur in the production of shock and that the vaso-motor centre is still active and capable of being stimulated.

These results, although largely of a negative value, prove quite conclusively that the lowering of the blood pressure in shock is not caused by the withdrawal of adrenalin. By inference it might be assumed that, since the presence of the adrenals or their absence has no apparent effect on the development of shock, the presence or absence of the pituitary glands would likewise be indifferent to the production of this condition. The solution of the problem, as has been pointed out in these columns, must be sought in further experiments in the laboratory and not by the bedside or in an arm-chair.

THE AFTER-EFFECTS OF CÆSAREAN SECTION.

SEVERAL of the leading obstetricians in the Commonwealth have recently issued a protest against the irresponsible and haphazard application of Cæsarean section as a means of rapid delivery. It is a matter of great satisfaction that this operation, which formerly was attended by an appallingly high death-rate, has become in skilled and experienced hands a safe procedure with a very low operative

mortality. Its safety, however, is dependent on its restriction to suitable conditions. Nature has determined that a fœtus shall be born slowly and by gradually applied muscular force through the curved genital passages. Under natural conditions the fœtal head can wend its way through these passages without damage into the outer world. The journey is accomplished without trauma to the mother and without danger to the child in the large majority of instances, provided that no uncalled-for interference changes a physiological into a pathological process. Meddlesome midwifery, as Dr. Fourness Barrington has more than once pointed out, is bad midwifery and is unjustifiable. When there is a disproportion between the size of the fœtal head and the smallest diameter of the inlet of the pelvis, when the mother's life is in imminent danger through some coincident affection, such as eclampsia, and possibly when other urgent reasons exist, demanding a more rapid delivery than can be effected through the genital canal, it may be necessary to perform Cæsarean section. At times it would seem that general practitioners have recourse to this operation merely to expedite delivery or to avoid preventible trauma; no doubt it is held that the mortality is very low and the harm done would appear to be minimal; the practitioner gains a reputation as a highly skilled surgeon by his dramatic performance of what is described as a life-saving operation. It is frankly fraudulent to subject a woman to a major operation unnecessarily in order to enhance a doubtful reputation. The conduct of labour demands gentleness, patience, knowledge, skill and modesty. The practitioner who does not possess these attributes, should not be trusted. The assumption that no harm is inflicted on a woman by incising the uterus for the purpose of delivery has been proven many times to be false. Rupture of an old scar occurs not infrequently and massive adhesions may be productive of much suffering. Moreover, mild forms of infection involving the incision are by no means rare. In 1917 Dr. J. Whitridge Williams called attention to the condition of the scar after Cæsarean section and announced his intention of having full details of his studies published at a later date. Dr. T. O. Gamble has completed this study and recounts the histological, clinical and pathological results.[1] It will be recognized that the operations performed at the Johns Hopkins Hospital were skilfully carried out by experienced surgeons and consequently that the results were better than those following operations by general practitioners. How much better they would be than those following operations by inexperienced men seeking to establish a cheap reputation at the expense of their trusting patients, must be left to the imagination.

The records on which the report is based are those of fifty-one women who had been subjected to Cæsarean section. The number of pregnancies was sixty-three. The delivery was effected by repeated Cæsarean section forty-five times and by natural vaginal delivery seventeen times. Rupture of the old scar occurred once. The study resolves itself into an inquiry into the cause of a thin, imperfect scar and incidentally into the manner of its rupture. In the first place, Dr. Gamble seeks for evidence of infection during the process of healing. Careful microscopical examination of the uterus after removal has been undertaken several times. No scar could be traced in the uterus of six out of seven women whose puerperium had been afebrile and in the uterus of three women out of eight whose puerperium had been febrile. Fever is regarded as an indication of infection and consequently it must be assumed that perfect healing may follow, even when some degree of infection has taken place. On the other hand, severe infection may lead to extensive necrosis and the resultant scar may be weak and very imperfect. Dr. Gamble gives adequate reasons for assuming that infection plays only one part in the determination of the type of scar. An imperfect scar at times follows when the sutures are not skilfully applied. In the Johns Hopkins Hospital a layer of deep, buried catgut sutures is used. Each suture is about one centimetre from the next, the decidua are avoided and great care is exercised to secure accurate apposition. The sutures are applied if possible when the uterine muscle is firmly contracted. Neglect of these points of technique often results in the formation of an irregular scar, with evident thinning of the uterine wall. The serous coat is closed with a superficial, continuous suture. The choice of suture material is a matter of individual preference. If silkworm gut or other material liable to irritate be employed, care must be taken to prevent the knots from protruding. Much evidence is adduced to show that adhesions may form even in the absence of infection, when considerable raw surfaces are left. The choice of site for the incision, the effect of the incision being made over the placental site and the effect of the placenta being implanted over the site of an old scar are dealt with by Dr. Gamble. These matters are relatively minor and pale into significance when compared with the important points already indicated. A glance at the drawings and diagrams depicting the proper technique of suture and the probable causes of imperfect scars will convince even the most daring amateur surgeon of the need for consummate skill and care in the performance of this operation. So great is the risk of creating a dangerous degree of physical impairment of the uterine wall that the obstetricians at the John Hopkins Hospital refuse to run the risk of repeated Cæsarean section. A sterilizing operation is carried out if Cæsarean section has to be performed thrice. Moreover, it is shown that Cæsarean section may often be avoided, even in women in whom it had previously been performed for pelvic dystochia. Vaginal delivery, either with or without forceps, was effected ten times, notwithstanding the fact that the previous labour had been terminated by Cæsarean section. All this goes to show that Cæsarean section should never be performed unless it is quite certain that no technical skill and properly applied knowledge will suffice to save both the mother and the child without it. In the absence of definite indications, the practitioner must remember the dictum that meddlesome midwifery is bad midwifery.

[1] *Bulletin of the Johns Hopkins Hospital*, March, 1922.

Abstracts from Current Medical Literature.

PATHOLOGY.

Recurrent Adeno-Myomata of the Uterus.

H. G. KUCHNER (*The American Journal of the Medical Sciences*, September, 1921) surveys the literature and records the results of his study of recurrent adeno-myomata of the uterus. The work of Cullen, which indicated a source for adenomyomata from the mucosa of the derivatives of the Müllerian ducts and particularly the endometrium, has supplanted the earlier conception of von Recklinghausen and his followers, who claimed that the glandular elements in such tumours arise from the Wolffian ducts. Further, Cullen has shown that portions of mucous membrane very similar to and apparently allied with endometrium may occur in places other than their normal position. He has found normal uterine mucosa upon the serosal surface of the cervix and suggests that the epithelial elements in adeno-myomata have probably originated from such aberrant patches. He states that tumours composed of unstriped uterine muscle and containing uterine mucosa are to be found in the uterus, recto-vaginal septum, tubes, round ligaments, utero-ovarian ligaments, sigmoid flexure, rectus muscle, umbilicus and that quantities of uterine mucosa may occasionally be found in the ovaries. Casler has described a peculiar diffuse uterine tumour in which the stroma of endometrium was abundant, but at no place were parenchymal structures observed. At a subsequent laparotomy upon the same patient, the left ovary was removed and showed a stroma-gland arrangement analogous to that of normal uterine mucosa. In the literature numerous instances of the association of carcinoma and adeno-myoma as separate tumours within the same uterus are quoted, but few allusions are made presenting a definite tendency toward malignant change within the gland structures of the adeno-myoma. The author's patient was a single woman, aged forty-three years, complaining of irregular, profuse and painful menstruation. Examination revealed a mass the size of a small orange occupying the vagina and protruding by means of a narrow pedicle through the cervix from within the uterine cavity. The exposed surface of the tumour mass was necrotic. The uterus was symmetrical and not enlarged. The tumour was removed by vaginal myomectomy. Microscopical examination of the neoplasm showed a dense, waving and interlacing fibro-muscular structure through which were irregularly distributed abundant gland structures lined by tall uniform columnar epithelium. Where the glands were dilated the parenchymal cells were somewhat flattened. Not a few of the acinar structures were surrounded by a richly cellular stroma of concentric arrangement as seen in normal endometrium. The diagnosis was *adenomyoma uteri*. Fourteen months later the patient again sought hospital with a return of all the clinical symptoms and a tumour the size of a fœtal head tightly wedged in the vaginal cavity. Myomectomy was again performed and the tumour found to be adeno-myoma as before. Eight months subsequent to the second operation the patient returned complaining of almost continuous bleeding. Abdominal hysterectomy was performed and in the uterine wall three distinct tumour masses were found. In places these tumours showed the presence of cysts containing clear, straw-coloured fluid. From the inner lining of some cysts lobulated cauliflower masses projected. These papillæ were almost invariably surmounted by a single layer of columnar epithelium and imparted a picture not dissimilar to that of an intra-canalicular fibro-adenoma of the breast. The triple recurrence of a supposedly benign growth is important. Three years after the beginning of the condition and fifteen months subsequent to the hysterectomy the patient enjoyed improving health and manifested no evidence of metastatic involvement.

Secondary Anæmia of Infants.

F. A. EVANS AND W. M. HAPP (*Bulletin of the Johns Hopkins Hospital*, January, 1922) have recently studied so-called infantile splenic anæmia or *anæmia infantum pseudo-leucæmica*. It is evident, they state, that great confusion exists concerning the nature and significance of the various types of anæmia occurring in infancy, particularly in regard to that symptom complex spoken of as von Jaksch's anæmia. This confusion is due to an attempt to apply the criteria used for adults to the interpretation of the blood picture in infants and also to the failure to appreciate the peculiarities of the response of the infantile hæmatopoietic system to infection and anæmia. A lymphocytic reaction is frequently observed in infants with anæmia and has been confused with leuchæmia. The authors consider that the anæmias so frequently encountered in infants with rickets, nutritional disorders and other conditions associated with enlargement of the spleen, liver or lymphatic glands and with quantitative and qualitative changes in the blood picture (such as anæmia, leucocytosis, erythroblastosis, lymphocytosis, myelocytosis) are merely secondary anæmias with varying predominant types of reaction. Von Jaksch in 1899 and 1890 described in his two papers four cases which showed, in addition to a diminution in the red blood cells and hæmoglobin, some poikilocytosis, a leucocytosis and enlargement of the liver, spleen and lymphatic glands. Rickets was present in at least two of these cases. No mention was made of qualitative changes in the blood picture other than increase of eosinophiles. Von Jaksch believed that the condition encountered in these patients was a clinical entity and that it was to be differentiated from leuchæmia because the liver was not so large, the anæmia was more severe, rickets was usually present and the malady in itself was not fatal. He suggested the name *anæmia infantum pseudo-leucæmica*. As a result of the investigation of their ten cases the authors conclude that in infants with anæmia enlargement of the spleen is frequent and enlargement of the liver and lymphatic glands is not uncommon. These signs alone are of no specific diagnostic or prognostic importance. The infantile hæmatopoietic system frequently reacts to anæmia with a relative lymphocytosis, by throwing out immature blood cells or with both of these qualitative changes in varying degrees of severity. Any of these reactions may be present with or without a leucocytosis and may have no serious significance. The presence, absence or degree of splenomegaly, hepatomegaly or general enlargement of the lymphatic glands, the severity of the anæmia, the total white blood cell count or the type of qualitative changes in the blood bear no constant relation to each other. This symptom complex has not been shown to be a disease *sui generis* and all variations of it are probably merely an infantile response to some agent producing secondary anæmia. It is not yet entitled to any special name.

Lysis and Microbic Variation.

ANDRÉ GRATIA (*Journal of Experimental Medicine*, March 1, 1922) has continued his studies on the Twort-D'Hérelle phenomenon. Bordet and Cinca first observed that when the few individuals still alive in a dissolved culture of *Bacillus coli* are transplanted on slanted agar, a culture results which possesses new characteristics. This culture received the temporary name of modified *Bacillus coli*. The author has found that this modified *Bacillus coli* is very heterogeneous and that its three principal characteristics, resistance to lysis, lysogenic properties and mucoid growth, are shared among different types of organisms. The original *Bacillus coli* of Bordet and Cinca (*Bacillus coli O*), when allowed to age was found by the author to dissociate into two types of organisms, the non-motile *Bacillus coli S* and the very motile *Bacillus coli R*. Submitted to lysis, *Bacillus coli S* gives a very small number, *Bacillus coli R* a much greater number of resistant organisms (*Bacillus coli SR* and *RR*), but neither type yields any mucoid growth. An old culture of the modified coli obtained by Bordet and Cinca, when streaked on an agar plate, gives two types of colony: a mucoid and fluorescent type (*Bacillus coli M1*) and a non-mucoid and translucent type (*Bacillus coli M2*). The mucoid and motile *Bacillus coli M1*, kept growing in synthetic medium, remains perfectly stable; on the other hand, when it is transplanted into broth, *Bacillus coli M1* turns very quickly into a non-mucoid but still very motile organism, *Bacillus coli*

M1B. By these and similar experiments a single strain of *Bacillus coli* has been made to yield eleven different forms, each possessing the specific properties of *Bacillus coli.*

PÆDIATRICS.

Intra-Peritoneal Injections of Salt Solution.

CLAXTON GITTINGS AND JOHN DONNELLY (*American Journal of Diseases of Children,* February, 1922) in 1919 made comparisons between various methods of administering water and collected statistics on the intra-peritoneal method. They first proved at necropsy that it was practically impossible to perforate the bowel by the sudden insertion of a needle through the abdominal wall. In the comparison of different methods of introducing water, the five usual routes were used at first—by mouth, by bowel, intravenously, sub-cutaneously and by intra-peritoneal injection. The first and last methods soon proved to be the only ones that permit of the safe and painless administration of water in sufficient amounts to be of real value. The occurrence of vomiting and the disinclination of the child to drink are the chief practical objections to the oral method. It was found that the use of the nasal tube (No. 8 to No. 12 French catheter) obviated the latter difficulty and that water introduced by this method was retained quite often, in spite of the fact that food would be vomited. In regard to intra-peritoneal injection, marked abdominal distension appears to be the only contra-indication, provided the bladder is empty. As a general rule, in dealing with infants under one year of age twenty to thirty cubic centimetres should be injected for each 480 grammes of body weight. The maximum is 300 cubic centimetres. In certain cases glucose in 5% solution was injected in place of normal saline solution, but this gave rise to so much distress and irritation that it was abandoned. The majority of the patients suffered from gastro-intestinal disturbances with diarrhœa and marked dehydration. Puncturing the peritoneal cavity seems to be a safe procedure, provided conditions are suitable and proper technique is observed.

Concentrated Cereal in Early Infancy.

GAYLORD GRAVES (*The American Journal of the Medical Sciences,* April, 1922) states that thick cereal is of exceptional value in controlling vomiting dependent on pyloro-spasm. Applicability of the thick cereal method to certain acute forms of diarrhœa which resist ordinary methods is likely to be established. Tolerance was exhibited by premature infants who had assimilated liquid food poorly. Twelve to twenty-four hours should suffice to distinguish between pyloro-spasm and stenosis. If throughout the period improvement is lacking, immediate operation by the Fredet-Rammstedt method is to be looked upon as conservative. The cereal of choice is probably farina, because of its property of great expansion under cooking, thus permitting thickening of the mixture with a minimum amount of added starch. Three or four tablespoonfuls in a half litre formula will insure sufficient solidification by the time cooking has reduced the quantity one-third, although at times greater concentration may be advisable. Skimmed milk, condensed milk, milk powder or breast milk may be incorporated in preference to cow's milk. For infants under six months two to three tablespoonfuls at a feeding ordinarily suffices.

Is There More Than One Kind of Rickets?

SHIPLEY AND PARK (*American Journal of Diseases of Children,* February, 1922) announce as a result of their experiments that they are led to believe that there are two main kinds of rickets. One is characterized by a normal or nearly normal blood calcium content and a low blood phosphorus content (low phosphorus rickets); the other by a normal or nearly normal blood phosphorus content but a low blood calcium content (low calcium rickets). If this hypothesis is correct, the relation of tetany to rickets would appear to be as follows: Tetany is essentially an expression on the part of the nervous tissues of an insufficiency of the calcium ion; rickets is essentially an expression on the part of the skeleton of disturbed relations between the calcium and phosphate ions of the body fluids. It seems probable that rickets is produced by the absence of certain active light rays and an unidentified dietary factor contained in cod liver oil associated with reduction of phosphorus or calcium and that varying influences may produce peculiar manifestations of the disease, amounting to more than one kind of rickets.

Cephalic Bruits in Children.

GEORGE A. STILL (*British Journal of Children's Diseases,* December, 1921) points out that most recent text-books on diseases of children fail to mention the subject of intra-cranial bruits, partly, no doubt, because these bruits have no recognized pathological significance and partly, perhaps, because it has been generally assumed that they have no clinical interest. The occurrence of a bruit over the open fontanelle in infants is widely known, but its occurrence in older children, and especially the recognition of its presence by the child himself, are less known. The method of examination when the fontanelle is open is by the stethoscope applied over the fontanelle; otherwise by direct application of the observer's ear to the patient's ear. This bruit is very infrequent in children over the age of four years. The usual character is a systolic blowing, sometimes almost twanging, bruit, clearly of arterial origin and very different from the continuous hum of a venous bruit. As a rule, it is only heard by the child when the external ear is closed so as to form a resonating cavity. It is of no serious import and is not connected with any particular morbid condition.

Children's Diets.

C. U. MOORE (*North-West Medicine,* September, 1921), after discussing the properties of the various vitamins and mentioning the foods which contain those vitamins in greatest amount, presents the general principles governing an ideal diet from birth onwards. First of all he gives breast milk for nine months. This is the ideal food, whether it contains 1% of fat or 10% of fat, and the only contra-indications to breast feeding are death of the mother, active tuberculosis or insanity in the mother. A properly balanced diet is, however, necessary for the mother. At six months cereals should be added to the diet of the breast-fed baby. At nine months he should be getting *purées* of the green vegetables. Eggs, especially white of egg, should not be given till much later. At fifteen months meats are given, beginning with sweet-breads and calves' or fish liver. After two years, as the child eats so many things, the problem is one of giving a diet properly balanced in regard to fats, proteins, carbo-hydrates, salts, water and vitamins. Six food groups are given from which the child may be fed: (*i.*) Vegetables: spinach, carrots, cauliflower, beets, string beans, potatoes. (*ii.*) Protein: milk, eggs, meat, fish, cheese, liver, kidney. (*iii.*) Cereals: whole meal (wheat), oatmeal, rice, bread, corn meal. (*iv.*) Fats: butter, yellow suet. (*v.*) Sweets: glucose, syrups, honey, jelly, jam, corn syrup. (*vi.*) Fruits: oranges, tomatoes, prunes, apricots, rhubarb, apples.

Hospitals for Babies.

HENRY L. K. SHAW (*Archives of Pediatrics,* November, 1921) writes that babies' wards in general hospitals or even in children's hospitals are not entirely satisfactory and the results are not so favourable as in special hospitals. No one can estimate the effect these hospitals have exerted on the medical thought of the country or how far-reaching have been their influence in the reduction of infant mortality and morbidity and in the scientific study and treatment of the disorders peculiar to infants. A hospital for babies offers many attractions to the pædiatrician. The larger part of his work is devoted to problems connected with disease and nutrition in infants. In a special hospital he has opportunity to perfect himself in his specialty. This experience is essential if he holds a teaching position in a medical school. Mothers and other visitors who come to see the babies receive, unconsciously perhaps, many valuable instructive object lessons in the nursing, care and feeding of infants. Every public health or visiting nurse should be required to take a course of training in a babies' hospital.

Special Abstract.

INDUSTRIAL HYGIENE.

DR. D. G. ROBERTSON, Divisional Director of the Division of Industrial Hygiene of the Commonwealth Department of Health, has issued a pamphlet dealing with the scope of industrial hygiene and the machinery required to safeguard the health of the worker.[1] He points out that health, comfort and contentment in the worker are vital factors in production. He sets up the thesis that no industry should exert an injurious influence on the health of the worker. Apart from the economic aspect, the protection of the work from accident and disease is to be regarded as a special function of hygiene. The recognition of the responsibility of the employer in regard to disablement caused by accident and disease consequent on the occupation of the employed must be followed as a natural corollary by the introduction of safeguards to reduce the financial liability to pay compensation. The Commonwealth Department of Health is developing an information centre in connexion with industrial health and safety available to all interested. A practical survey will be carried out in any industrial establishment at the request of the employer. The recommendations based on this survey will enable the employer to adopt the measures best suited to the conditions of his establishment.

The Division of Industrial Hygiene has been established with two objectives. They are to develope hygienic standards for industries and to develope and standardize systems of medical and surgical service. In order to achieve these objectives, researches are to be carried out into the general hygienic conditions of special industries, into specific occupational diseases and poisoning, into the physiological requirements of the workers in different occupations and into the requirements for furthering industrial safety and for introducing safety codes. The Division is prepared to install and supervise departments of health and sanitation in industries under the control of governments, to introduce and standardize records and reports and to direct research into actual or alleged occupation risks. A consulting service will be available for privately owned industries.

Industrial clinics are being instituted at various centres in the Commonwealth with adequate equipment. These clinics are intended for use for research into industrial disease.

In describing the so-called health service, Dr. Robertson advocates the employment of a medical practitioner and the establishment of a dispensary in connexion with every industrial plan. In the case of the smaller industrial undertakings, it may be necessary for two or more to institute a common medical service. The equipment comprises first-aid boxes, ambulance rooms and whole-time medical service.

The first-aid boxes are intended for minor injuries. Their number and situation must be determined to suit the peculiarities of the establishment. The Home Office in England requires one box for every hundred and fifty workers. Many suggestions are given in regard to the contents of these boxes and some illustrations are appended. Dr. Robertson also gives some elementary instructions in regard to the manner in which an employee or any untrained person may apply the dressings pending the arrival of a medical practitioner or trained nurse.

The ambulance room is described in some detail. A list of articles that should be provided for works at which up to one thousand persons are employed, is given.

In the following chapter Dr. Robertson discusses the organization of the first-aid work in factories. He suggests the institution of a first-aid committee, which should be responsible for considering all suggestions regarding the provision of first-aid boxes and for seeing that the equipment is adequate and in good condition. He holds that, while one person should be placed in charge of the first-aid box, this person should not be the only one trained to use the dressings. More skill and knowledge is required for the control of the ambulance room. The room should be placed under the charge of a trained nurse, or, if this be impossible, of a person with a certificate of first-aid training. He insists on the importance of having proper records kept of all accidents, including trivial ones.

In dealing with the whole-time medical service, Dr. Robertson sketches the functions it is intended to perform. The first essential is the proper placement of the work. It should be a duty of the medical practitioner in charge to investigate the processes utilized in the industry and the physical and temperamental qualities needed for the working of each phase of the undertaking. In this way he will be able to suit the employee to his work. Incidentally he will become familiar with the risks associated with each operation, so that safeguards may be introduced and preparations made for the application of treatment in the event of an accident or illness. It is held to be desirable for the medical service to follow the injured or sick employee to his home, so that the employer may be satisfied that he is receiving proper attention. The industrial medical hygienist is concerned with the problem of fatigue and must be prepared to advise the employer when any operation is producing exhaustion, so that adequate periods of rest may be interposed.

The physical examination of the workers should be carried out prior to employment, after absence arising from injury sustained in the course of work or from illness due to work conditions, when a worker becomes ill during work, when the occupation is apparently unsuited to the worker, as a means of protecting the employees from infections when one of them are attacked, when a person is engaged to carry out work known to be dangerous to health and periodically for the purpose of ascertaining the standard of health of the workers.

The third function of the whole-time medical service is the supervision of the hygiene of the factory. Regular inspections of every part of the works should be made and special attention should be directed to the detection of influences likely to exert a deleterious effect on the health of the workers. The subjects of ventilation, illumination, temperature, humidity, floor space, the presence of harmful dusts, gases and fumes and so forth would come within this chapter of activity. Dr. Robertson holds the opinion that the industrial hygienist is directly concerned with the number of hours of labour, with the question of monotony of the performance of certain tasks, with the demand from the worker of concentration and rapid working and with the existence of noises in the factory. The provision of mechanical safeguards also comes into his purview.

Apart from the direct effect of the employment on the health of the worker, there is the general application of rules of hygiene to be considered. It is evident that even if the most elaborate measures were adopted to protect the workers from accident and disease arising during or on account of the employment, little would be gained if the elementary rules of hygiene were neglected by the workers. Various suggestions are made to instruct them in regard to safe living.

Although the chief aim of the service is to prevent illness and accident, treatment is required when either occurs. The surgical treatment for industrial injuries needs no special description. In the case of the treatment for illness, the worker would be referred to his usual medical attendant, although the service doctor would give any emergency treatment.

The accommodation of the medical department would vary with the size of the factory, the number of employees, the risks of the particular trade and so on. Many points are discussed and the minimum requirements are set out. Dr. Robertson recognizes the advisability under certain conditions of establishing elaborate services, with operating theatres, X-ray room, dental surgery, ophthalmic room and so on. He proposes, however, that no equipment should be introduced until it has been shown that it is essential.

In conclusion, Dr. Robertson refers to the experience of the Bell Telephone Company, of Pennsylvania, in regard to the value of a well-equipped medical service. Since this service was instituted in 1917 there has been a reduction in lost time of 7.78 days *per annum* for every hundred workers employed.

[1] "The Scope of Industrial Hygiene," by D. G. Robertson, M.D., D.P.H.; Service Publication No. 20, Commonwealth Department of Health; 1922. Melbourne: Albert J. Mullett, Government Printer; Demy 8vo., pp. 44, with nine plates.

British Medical Association News.

SCIENTIFIC.

A MEETING of the Victorian Branch of the British Medical Association was held in the Lecture Room of the Walter and Eliza Hall Institute of Research in Pathology and Medicine, Melbourne Hospital, on May 3, 1922, the President, DR. JOHN GORDON, in the chair.

Welcome to Sir John Grice.

SIR JAMES BARRETT, K.C.B., C.B., C.M.G., welcomed Sir John Grice, who had been invited to the meeting by the Council to hear a communication from Dr. E. H. Derrick, the Sir John Grice Cancer Research Scholar. He expressed the appreciation of the medical profession in Victoria for the action he had taken some years ago in setting aside a sum of money to further research into the obscure problems of malignant disease. Supplemented by the Government of Victoria, this sum had founded the scholarship. Sir James reviewed the work hitherto carried out and published by former holders of the scholarship and said that the present was a very appropriate occasion for the medical profession in Victoria to express its gratitude to Sir John Grice.

SIR JOHN GRICE thanked the meeting for the demonstrations of appreciation. The scholarship was at present not permanently endowed, but he had felt a desire to do what he could to encourage research into such a formidable disease as cancer. He hoped to see the work in Melbourne carried on. The holders of the scholarship would find the work sufficiently attractive to induce them to pursue the subject in those parts of the world where the study of cancer was most advanced; they would return to Australia authoritatively informed on all lines of research in connexion with cancer.

Renal Tumours.

DR. E. H. DERRICK read a paper on "Renal Tumours" (see page 623).

DR. JULIAN SMITH, in discussing the diagnosis of renal tumours, introduced his remarks by expressing his admiration for the excellent paper that Dr. Derrick had read on the pathology of renal tumours. He said that he found it very refreshing to return to pure pathology after so many years of the drudgery of practice and he for one had to thank Dr. Derrick for putting Grawitz tumour in its place.

His experience was that the outstanding feature in renal tumour was hæmaturia. In connexion with this symptom, he felt very strongly that every case of hæmaturia was an immediate and great responsibility upon the medical man. Too often it had occurred that this always important complaint had been complacently disregarded because of its temporary cessation and months later, after the loss of valuable time and the recurrence of the hæmaturia, the patient came to the surgeon.

In the diagnosis of tumour, of course, a cystoscope would be used and the origin of the blood narrowed down to one or other kidney, so that they were faced with a problem as far as hæmaturia was concerned of blood coming from one kidney. Then it remained to exclude such well-known causes as tuberculosis of that kidney by careful urinary study and examination of the tract generally and stone of that kidney by a good skiagram. It was also necessary to exclude the various constitutional causes of hæmorrhage. But even when this was done, the diagnosis was not necessarily clear. He referred to a recent case investigated in the St. Vincent's clinic. A man, aged forty years, had given a history of blood in the urine for five months on many occasions. When examined, the blood had been seen on several occasions to be coming from the left kidney. His general condition had been no worse than that of any other patient who had lost the same quantity of blood. He had no pain and there was no evidence of tuberculosis. There were no signs of stone; a perfectly regular lower pole of his kidney was seen in the skiagram. A provisional diagnosis of tumour had been made and an exploration performed. A perfectly normal kidney had been discovered; it had been explored by incision. The kidney had been sewn up and returned; the patient recovered and the hæmorrhage ceased. Dr. Smith stated that this case exemplified the difficulties of the subject.

At times the hæmorrhage did not cease. It had been ascribed to papillitis and other vascular derangements. Dr. Smith admitted that he found it very difficult to explore the kidney in this way and be sure of the findings. It was very difficult to know what to do with these kidneys which bled without obvious cause. In his knowledge some disasters had occurred.

In regard to the diagnosis of these conditions, pyelography offered a further means of investigation. A 20% sodium bromide solution was instilled into the ureter and the calyces filled so that their shape could be seen in the skiagram. The presence of a tumour would be indicated by a warping or flattening out from the normal of one or more of the calyces.

Recently a urinary test has been suggested for the diagnosis of tumour. The test was based on the observation that normal urine could be diluted with distilled water to a far greater degree before it hæmolysed red corpuscles than the urine from a kidney affected with tumour and nephritis.

The next important sign of renal tumour was a swelling, but the unfortunate thing was that in many cases of renal tumour no swelling could be found. If the tumour had reached such a size as to be palpable, its diagnosis from other swellings in one or other loin had to be made. One sign common to all true renal swellings was the fact that they could be felt posteriorly impinging on the examining hand, whilst the other hand pressed the tumour backwards. Occasionally a pedunculated right lobe of the liver simulated a renal tumour. The same applied to certain gall bladder swellings of large size. Occasionally even an ovarian cyst would lead to difficulty and, although a normal spleen had its well-known sharp and notched anterior edge, some swellings of the spleen, as, for instance, those due to hydatids, might be puzzling.

Turning to the third sign of renal tumour—pain—he pointed out that in most cases it was not a reliable symptom. Of course, when the bleeding occurred with more or less blocking of the ureter, pain in the form of a typical colic was occasionally met with, but, apart from that, until the advance of the tumour led to infiltration of surrounding structures, pain was little more than a dull ache or a dragging in the back or loin. When much pain occurred, apart from renal colic, it was a bad sign, as it usually meant the infiltration of surrounding structures by the advancing malignant growth.

Dr. Smith said that Dr. Prendergast, the Registrar of St. Vincent's Hospital, had analysed a series of renal tumours occurring during the past few years. The series included eighteen and they were classed as follows: Three were indefinite, five were Grawitz tumours, four were sarcomata, one each was carcinoma, papilloma of the pelvis, polycystic disease and retention cyst and two were hydatid cysts.

In his private practice Dr. Smith had encountered four Grawitz tumours, one sarcoma, one bilateral cystic kidney, one hydatid cyst and one large retention cyst. He felt rather hopeless about the outlook of renal tumour. Of the four patients with Grawitz tumours, all were dead. Two had died of mediastinal recurrence at periods of two and five years respectively after operation, one of jaundice and liver enlargement and one of pulmonary embolus some months after the operation, probably due to loosening of recurrent growth fungating into the *vena cava*. The patient with sarcoma had died rapidly. The patient with hydatid cyst had her kidney removed, lived and bore children well. The patient with double cystic kidney was untouched and was progressing in the same state of health. He felt that, unless some means were devised for an earlier diagnosis of renal tumour, the outlook was distinctly bad.

MR. ALAN NEWTON read a paper on "The Treatment of Renal Tumour" (see page 634).

MR. R. C. BROWN expressed the very great interest with which he had followed Dr. Derrick's scientific exposition of the subject of renal tumours. From the remarks of Dr. Julian Smith it would appear that there had not been much advance in the clinical diagnosis of renal

tumours during the past twenty years, although he was bound to admit that recent advances in the technique of radiography had improved the means of diagnosis. Cystoscopy was no doubt the greatest help in the diagnosis of non-palpable renal tumours and the localization of the pathological process to one or other side by the evidence of blood or clot being extruded from one ureteric orifice was indispensable when the tumour could not be detected by palpation or by radiography.

Mr. Brown said that his own experience of renal tumours was limited to nine instances. One of the series could not be felt at all; two of the tumours, one of which occurred in a child, were very large. Of the three children in whom he had seen renal tumour, all died within a year and none of them at any time exhibited hæmaturia. In the case of a man with a very large renal tumour, which caused his death in eighteen months, hæmaturia was at no time observed, not even by repeated microscopical examinations of the urine.

The case of one of the children he had mentioned was remarkable for its unusually long course, eight years from the first appearance of the growth. As this case was also interesting in other respects, he proceeded to relate it in detail.

At the latter end of 1907 a lady had brought to him her young son, aged three years, and had requested him to examine the child periodically as he had had a sarcoma of the right kidney which had disappeared. From the history given by the mother he had learned that the illness had begun in Durban when the boy was seven months old, at which time a swelling in the right loin had been noted. The swelling had continued to increase in size; it had been examined under anæsthesia by five medical men, all of whom had diagnosed an inoperable sarcoma of the right kidney and had told her that the boy would shortly die. He had been kept under observation and the tumour had become enormous, with very large veins coursing over the abdomen. The child had become progressively thinner until he was almost a skeleton with a very prominent abdomen due to the presence of the huge growth. There had not been any blood in the urine and the boy had appeared to suffer no pain.

When the patient had attained the age of two years, the swelling had begun to diminish in size and concomitantly the boy had gained in weight and strength. His mother had brought him to Victoria and at the age of three years he had walked into Mr. Brown's rooms for examination.

Mr. Brown could not detect any loin tumour; it had apparently disappeared. The boy had remained well, though not strong until he had reached the age of seven and a half years, when he had contracted measles, complicated by broncho-pneumonia. At this time no growth could be detected. However, six months later he had become less well and his mother fancied his loin was swelling.

On examination of the right lumbar region there was evident a large tumour, smooth, oval, descending with respiration and giving the *ballottement* sign with posterior propulsion. At the mother's request operation was delayed for two months. On May 15, 1913, Mr. Brown had operated and had found a large right-sided renal tumour, which had burst through the capsule and had infiltrated the parts in the neighbourhood of the upper pole. The condition was quite inoperable and the child had died of exhaustion two months later at the age of eight and a half years.

A microscopical examination had been made of a small piece excised from the upper pole of the tumour and a report of sarcoma had been received from the University Laboratory.

A question for consideration was: "Should the growth have been removed during the period of its recession?" On this point the late J. B. Murphy had pronounced in the negative, stating that if the growth were removed it would re-appear in the other kidney. Murphy had recorded a case very similar to that of the boy whose history he had just outlined; when the patient was five years of age, he had removed a diminished tumour; within a year a recurrence had appeared in the kidney of the opposite side.

Mr. Brown briefly reviewed the history of a man upon whom he had operated for the removal of a large renal tumour of eighteen months' duration, which had reduced the patient to a state of great weakness and emaciation. The patient had called on him three years later; he had been following his occupation and had become apparently robust. Very shortly afterwards he had sustained a fracture of the humerus on some trivial muscular exertion and in a similar fashion had fractured his femur. Metastases had quickly appeared in other parts and death had supervened. Operation had been justifiable in this instance, as it had afforded the patient three additional years of active life.

In some remarks on the surgical approach to large kidney tumours, Mr. Brown expressed a preference for the para-medial incision with combined incision and muscle-splitting through the *rectus abdominis* and flat muscles in the extension laterally to the loin. He considered that such an incision gave the best approach and enabled the surgeon to control hæmorrhage well. With reference to the risk of subsequent hernia he might say that he had used the incision indicated for splenectomy performed for rupture of the spleen; the patient had since been carrying out heavy work in the country and had not been handicapped by weakness of the abdominal wall.

DR. K. STUART CROSS said that he wished to draw attention to two recent advances in the radiography of the kidney.

With the improved technique consequent on the introduction of the Potter-Bucky diaphragm, it should be possible to obtain in practically all cases a complete shadow of the kidney on both sides; even the papillæ could be seen at times. In a good film the liver margin and frequently the gall bladder should be distinguishable, in addition to the right renal outlines.

It was a matter of experience with this technique that within limits the fatter the patient the more definite was the kidney shadow obtained, as the surrounding bed of peri-nephric fat, being of lighter density, provided the contrast against which the kidney showed more clearly.

In the second place, Dr. Cross referred to the work of Carelli, of Buenos Ayres, who recently, before an informal meeting of the Royal Society of Medicine, had given a demonstration of his method of obtaining improved skiagrams of the kidney by the production of an artificial emphysema in the peri-renal tissues. The apparatus employed was similar to that in use for inflating the peritoneal cavity. After an initial skiagram had been taken, carbon dioxide was introduced into the peri-renal tissues. A long platinum needle was passed down alongside the transverse process of the second lumbar vertebra and the registering of the respiratory excursions on a manometer indicated when the needle reached the peri-nephric region. The gas was then injected and the photograph taken without loss of time, as the carbon dioxide was soon absorbed. The results of the application of this method, as reproduced, appeared to be excellent. The kidney and suprarenal bodies contrasted brilliantly against the background of gas.

In conclusion, Dr. Cross remarked that a great deal might be accomplished in the radiographic diagnosis of renal tumours by the use of the Potter-Bucky diaphragm and in doubtful cases the second method he had mentioned might be given a trial. He would like to hear some surgical opinions regarding the feasibility of this method.

MR. H. B. DEVINE tendered his congratulations to Dr. Derrick and remarked that his excellent paper would clarify the ideas of all present on the subject of renal tumours.

He wished to emphasize the point made by Mr. Julian Smith regarding the great necessity for complete investigation of the cause underlying hæmaturia in any particular instance. He had seen many patients with hæmaturia who had been drifting about from doctor to doctor, now better, now worse, for perhaps eighteen months and the essential cause of the leading symptom remained unelucidated for want of systematic investigation. Some of these had been cystoscoped and a diagnosis of hæmorrhage from a prostatic vein had been made. Apparently this was due to the traumatism of the cystoscope. Had the

examination been skilfully and persistently carried out in the early history, a unilateral hæmaturia would have been found and exploration would have revealed an early Grawitz tumour.

If a unilateral hæmaturia could be made out, then that kidney should be immediately explored. He had never seen exploration do any harm. Whether the kidney should be opened was another matter.

As illustrative of the necessity for great care in the systematic examination of a case of hæmaturia, Mr. Devine related the history of a man with intermittent left-sided ureteric pain and a hæmaturia. Cystoscopic examination had disclosed a small, sessile tumour in the bladder, apparently malignant, and by a satisfactory ureteral catheterization it had seemed to be established that no blood was coming from either kidney. The tumour in the bladder had been removed, but eight weeks later hæmaturia recurred. Again the ureters had been catheterized and in the separate samples of urine no blood or albumin could be detected. On the next occasion no blood had apparently been coming from either ureteric orifice on cystoscopic examination until the kidney on each side had been squeezed, when stale blood in the urine had been forced through one ureteric orifice. This patient had been found by exploratory operation to have a Grawitz tumour in the upper pole of the left kidney. The kidney had been removed and it was interesting to relate that this man was still alive after two and a half years, notwithstanding his bladder implant.

Exploration did not always reveal an early hypernephroma. Mr. Devine could recall an instance in which the source of hæmaturia had been localized to the left kidney. At operation with very careful examination no apparent pathological condition in the organ had been detected and he had returned it without splitting the parenchyma. Twelve months later an unmistakable hypernephroma had been present. Probably the growth had originated close to the pelvis and hæmaturia was, therefore, a very early symptom. Obviously, then, the size of the kidney as outlined by injection of oxygen which Dr. Cross had advocated, had its limitations. Sometimes every means at the disposal of the surgeon would fail to disclose a tumour in the kidney, but he wished to urge very strongly that every hæmaturia should be followed to its source persistently. If it could be localized in one kidney, exploratory operation should always be undertaken; if an external examination of the kidney and possibly a pyelotomy did not reveal a pathological condition, the hæmaturia was not generally surgical or serious.

He agreed with Mr. Newton that the majority of renal tumours could be well approached through a lumbar incision, but with a special form of retraction and good mobilization he seldom found it necessary to resect the last rib. But there was no doubt that very large tumours extending upwards high under the diaphragm could be delivered forwards by the abdominal route with greater ease than below the ribs and with less handling. Much handling favoured dissemination. There was also the additional advantage that the colon, which was often adherent and continually in danger when the operation was done retro-peritoneally, could be dissected under sight from the tumour. It was also easy to get at the renal pedicle by this route. Many of his patients had been seen late, mainly because proper investigation had not been insisted on and in these the disease had recurred. Others who came under treatment earlier, were still immune. Early diagnosis was the only hope they had to obtain a surgical cure in this dangerous disease.

DR. D. MURRAY MORTON joined with previous speakers in tendering congratulations to Dr. Derrick upon his lucid treatment of the subject of renal tumours and proceeded to discuss the course the surgeon should pursue when called upon to deal with persistent hæmaturia. It was necessary to remember always that there was at least a good chance of the underlying condition being a malignant neoplasm and it was imperative to localize the source of the hæmorrhage to one or other kidney (if of renal origin) and at the same time to establish that the opposite organ was functioning well. The surgeon was then in a position to undertake nephrectomy and in this connexion he would go further than Mr. Devine, who had urged early and routine exploration and advocate nephrectomy as often the only measure which would insure finality. It was to be noted that many patients upon whom nephrotomy was performed, required a subsequent nephrectomy. Mr. Newton had quoted two instances of such sequence from literature and also one in his own experience.

In dealing with persistent hæmaturia, with the patient out of health for a considerable time, it seemed to him that nephrectomy was the only course which could be relied upon to achieve finality.

With reference to the route by which renal tumours might be removed, Dr. Morton said that for large tumours he preferred a free abdominal incision, such as had been described by Mr. Brown. He did not think there was so much risk of damage to the colon and peritoneum as attended the operation by the lumbar route. In his experience nephrotomy was an operation involving a considerable risk and actually a much more dangerous operation than nephrectomy, provided that a normal functionating kidney on the other side had been proved to be present.

DR. WM. DISMORE UPJOHN, O.B.E., remarked that, in addition to the pathological distinction between the Wilms and Grawitz tumours so clearly shown by Dr. Derrick, there were definite clinical differences between the two types. The former occurred in children and was exceptionally associated with hæmaturia, while the latter affected adults, in whom, as a rule, hæmaturia was the first symptom.

In the clinical record of the three children quoted by Mr. Brown, it was to be noted that there had been no hæmaturia and as a general rule the children affected with the neoplasm under discussion were brought along with the two main features of cachexia and tumour. It had been stated, however, that hæmorrhage from the kidney occurred in 5% of children presenting this particular type of malignant growth in the kidney.

The operative and post-operative mortality was very high; few children survived to adult life and very many died within a year.

In the matter of the operative incision, Dr. Upjohn said that he had found the abdominal incision much the better in operating upon children; in these small patients sufficient room could not be obtained by means of the lumbar incision and the abdominal incision could always be extended to the loin in a direction parallel to the last rib.

MR. G. A. SYME said that he had been greatly interested in the exceedingly able presentation of the pathology of renal tumours by Dr. Derrick. He himself had always felt that the term "hypernpehroma" was an anomalous designation for kidney tumours and was pleased that the term had been rejected scientifically.

With regard to diagnosis, Mr. Julian Smith had emphasized that pain was seldom a feature of renal tumour. While that was true, he had seen several instances in which pain had been a prominent and even the dominant symptom. Colic due to the passage of clot down the ureter had occurred before there was any palpable tumour.

He recalled one particular patient who had suffered agonizing pain, not attended in the first instance by any blood in the urine. The provisional diagnosis of calculus had been made, but very shortly repeated attacks of hæmaturia had supervened. Radiographic examination had failed to disclose a neoplasm and it was decided to explore the kidney. Operation had disclosed a Grawitz tumour in the upper pole of the organ. The patient had died of recurrence within two years, although the nephrectomy had been carried out at a comparatively early stage.

The method of X-ray examination mentioned by Dr. Cross, in which an artificial emphysema was produced in the peri-renal tissues, ought to prove of advantage. While there was no doubt that present methods of radiography of the kidney were much advanced in comparison with those of a few years back, the upper pole was often not defined and, unfortunately, it was just the situation in which renal tumours were most prone to occur.

In some remarks on the method of approach in operating for the extirpation of renal tumours, Mr. Syme said that he was in agreement with Mr. Newton in the objections he had put forward to the abdominal incision. He

was speaking with reference to adults and had always advocated the lumbar incision and had frequently taken the advantage to be gained by resection of the last rib, as indicated by Mr. Newton.

The prognosis was undoubtedly very bad and as Mr. Upjohn had said in children it was scarcely worth while operating. He could not recollect one instance of permanent recovery among children affected with a malignant tumour of the kidney.

DR. H. DOUGLAS STEPHEN spoke as having operated upon a number of children for removal of a Wilms tumour and said that he had yet to see the 5% to 10% recovery rate claimed to have been attained. He could not recollect one instance of recovery; the majority of children survived the operation, only to return after six or eight months with recurrence in the retro-peritoneal glands. In the absence of hæmaturia and pain the child was not as a rule brought along until the parents noticed the swelling and surgical intervention was therefore late. Until these neoplasms were attacked earlier, they could not hope for any reduction in the mortality.

MR. BALCOMBE QUICK, D.S.O., urged that the patient with hæmaturia should be referred for cystoscopy during the attack and before the bleeding subsided. It was not uncommon to be called upon to investigate the cause of hæmaturia after the hæmorrhage had ceased. While a satisfactory report might be furnished if the source of the bleeding were found in the bladder, if the blood were of renal origin it was often necessary to await the next attack in order to give a final statement.

Too much significance should not be attached to microscpical amounts of blood in specimens collected by the ureteric catheter, as some red blood corpuscles frequently appeared as the result of the catheterization.

NOMINATIONS AND ELECTIONS.

THE undermentioned have been nominated for election as members of the New South Wales Branch of the British Medical Association:

DE BURGH, HUGO MACARTNEY, M.B., Ch.M., 1922 (Univ. Sydney), Royal Prince Alfred Hospital, Camperdown.

EVANS, EDWARD FRANCIS HEPBURN, M.B., Ch.M., 1922 (Univ. Sydney), Sydney Hospital.

THE undermentioned have been elected members of the Victorian Branch of the British Medical Association:

FLYNN, WILLIAM JAMES, M.B., B.S., 1922 (Univ. Melbourne), St. Vincent's Hospital, Melbourne.

CAMPBELL, KATE ISABEL, M.B., B.S., 1922 (Univ. Melbourne), Melbourne Hospital.

CURWEN-WALKER, MALCOLM CLAUDE, M.B., B.S., 1922 (Univ. Melbourne), 13, Lewisham Road, Windsor.

LINK, HAROLD SELBY, M.B., B.S., 1922 (Univ. Melbourne), 44, High Street, Kew.

NOTICES.

THE COUNCIL OF THE VICTORIAN BRANCH OF THE BRITISH MEDICAL ASSOCIATION has arranged the following provisional programme of the Branch. The Scientific Committee reserves to itself the right to modify the arrangements, but it is hoped that no changes will be necessary.

July 5, 1922.

At the Alfred Hospital.

A CLINICAL MEETING will be held, of which the details will be announced later.

BIRTHDAY HONOURS.

THE medical profession has received moderate recognition this year on the occasion of His Majesty's birthday.

DR. JOHN MACPHERSON, C.B., Commisioner in Lunacy for Scotland, President of the Medico-Psychiatric Association and formerly Lecturer on Mental Diseases at the Royal School of Medicine, Edinburgh, has been created a Knight Commander of the Order of the British Empire. It is stated in the daily press that Sir John Macpherson has been appointed to the Chair of Psychiatry at the University of Sydney. While this information is probably correct, we have received no confirmation of it from the Senate of the University.

Much gratification will be felt on the award of the same honour to PROFESSOR WILLIAM MADDOCK BAYLISS, M.A., D.Sc., F.R.S., Professor of General Physiology at the University College, London. It is unnecessary to refer to the value of his work generally and especially on the nature of surgical shock. Sir William Bayliss has for long been associated with Professor E. H. Starling, C.M.G., F.R.S., to the benefit of the scientific world. Sir William is President of the Physiological Section of the British Association for the Advancement of Science and joint editor with Professor Arthur Harden, D.Sc., F.R.S., on *The Biochemical Journal.*

The honour of knighthood has been conferred on DR. DAVID MAURICE SERGEANT, a graduate in medicine of the University of St. Andrews of 1862.

Proceedings of the Australian Medical Boards.

NEW SOUTH WALES.

THE undermentioned have been registered under the provisions of the *Medical Act, 1912 and 1915,* as duly qualified medical practitioners:

ALLEN, RAYMUND ASHER MILTON, M.B., Ch.M., 1922 (Univ. Sydney), Dudley Street, Roseville.

ANNETTS, HENRY ALLAN, M.B., Ch.M., 1922 (Univ. Sydney), 14, Miller Street, Petersham.

ARMSTRONG, EDWARD PATRICK, M.B., Ch.M., 1922 (Univ. Sydney), "Butchers' Arms Hotel," Pyrmont.

ARBATTA, JOSEPH ANDREW, M.B., 1922 (Univ. Sydney), "Red Lion Hotel," Rockhampton.

BERTRAM, MARY NICHOLL, M.B., Ch.M., 1922 (Univ. Sydney), Forbes Street, Trundle.

BOYD, ARCHIBALD SPROTT, M.B., Ch.M., 1922 (Univ. Sydney), "The Hollies," Eden.

BRADLEY, GILBERT GEORGE, M.B., Ch.M., 1922 (Univ. Sydney), Johnson Street, Chatswood.

BRAKE, CLIFFORD ERROL, M.B., Ch.M., 1922 (Univ. Sydney), Orpington Street, Ashfield.

BRYANT, ARNOLD LESLIE, M.B., Ch.M., 1922 (Univ. Sydney), Park Road, Marrickville.

BURRELL, ARTHUR ERNEST WINTON, M.B., Ch.M., 1922 (Univ. Sydney), Moss Vale.

CAMERON, STEWART LLOYD, M.B., Ch.M., 1922 (Univ. Sydney), Wyuna Road, Point Piper.

COOKE, BADEN RANDELL, M.B., Ch.M., 1922 (Univ. Sydney), Laman Street, Newcastle.

DAVY, ASHLEIGH OSBORNE, M.B., Ch.M., 1922 (Univ. Sydney), c.o. G. V. Davy, "Denman Chambers," Phillip Street, Sydney.

DE BURGH, HUGO MACARTNEY, M.B., Ch.M., 1922 (Univ. Sydney), Hopetoun Avenue, Vaucluse.

DINLEY, ROY PATRICK JOSEPH, M.B., Ch.M., 1922 (Univ. Sydney), Canonbury Grove, Dulwich Hill.

DRUMMOND, ALEXANDER PETER, M.B., Bac. Surg., 1914 (Univ. Melbourne), Lockhart.

DUNCAN, GEORGE JOSEPH, M.B., Ch.M., 1922 (Univ. Sydney), St. Vincent's Hospital, Darlinghurst.

DUNSTAN, CHESTER KINGSLEY, M.B., Ch.M., 1922 (Univ. Sydney), Ocean Street, Bondi.

EVANS, EDWARD FRANCIS, M.B., Ch.M., 1922 (Univ. Sydney), Ben Boyd Road, Neutral Bay.

EWAN, GREY LAMONT, M.B., Ch.M., 1922 (Univ. Sydney), Homebush Road, Strathfield.
FENNER, NORMAN EDGAR, M.B., Ch.M., 1922 (Univ. Sydney), "Blackstone Flats," Elizabeth Bay.
FIELDING, UNA LUCY, M.B., 1922 (Univ. Sydney), "St. Matthias's Rectory," Paddington.
FLATTERY, JAMES MARTIN, M.B., Ch.M., 1922 (Univ. Sydney), Caledonia Street, Paddington.
FLYNN, JAMES ALOYSIUS FŒDUS, M.B., Ch.M., 1922 (Univ. Sydney), Centennial Park.
FORSYTH, GORDON, M.B., Ch.M., 1922 (Univ. Sydney), Bundock Street, Coogee.
FRASER, FARQUHAR WILLIAM, M.B., Ch.M., 1922 (Univ. Sydney), "Boronia," Seven Hills.
GALLAGHER, WILLIAM PATRICK, M.B., 1922 (Univ. Sydney), c.o. Dr. Lane, Cessnock.
GEORGE, WILLIAM ELLIS, M.B., Ch.M., 1922 (Univ. Sydney), Double Bay, Como.
GOARD, EDWIN MOULSEY, M.B., 1921 (Univ. Sydney).
GREEN, HARRY, M.B., 1922 (Univ. Sydney), 163, Cathedral Street, East Sydney.
HAMILTON, THOMAS, M.B., Ch.M., 1922 (Univ. Sydney), The Hill, Newcastle.
HARDY, RUTH, M.B., Ch.M., 1922 (Univ. Sydney), Royal Prince Alfred Hospital, Camperdown.
HARPER, HAMILTON SIDNEY, M.B., Ch.M., 1922 (Univ. Sydney), 6, Anderton Street, Marrickville.
HARWOOD, HORACE BARCLAY, M.B., Ch.M., 1922 (Univ. Sydney), Macleay Street, Potts' Point.
HEATH, LEO BARCLAY, M.B., Ch.M., 1922 (Univ. Sydney), Royal Prince Alfred Hospital, Camperdown.
HILLIARD, ERIC THEODORE, M.B., Ch.M., 1922 (Univ. Sydney), 2, Sutherland Street, Watersleigh.
HINDMARSH, BERNARD FRANCIS, M.B., Ch.M., 1922 (Univ. Sydney), Bengalla Street, Warrawee.
HONNER, RICHARD ST. JOHN, M.B., Ch.M., 1922 (Univ. Sydney), St. John's College, Camperdown.
HOUEN, ANTONIO CHARLES, M.B., Ch.M. (Univ. Sydney), Cavendish Street, Stanmore.
HOWELL, KENNETH JAMES, M.B., Ch.M., 1922 (Univ. Sydney), 33, Arcadia Street, Glebe.
HUIE, JOHN ZIEGLER, M.B., Ch.M., 1922 (Univ. Sydney), "Heatherton," Blackheath.
HURMAN, EDITH MYRA, M.B., Ch.M., 1922 (Univ. Sydney), Burlington Road, Homebush.
KERR, WILLIAM ARTHUR, M.B., Ch.M., 1922 (Univ. Sydney), Morton Street, Wollstonecraft.
LUDOWICI, RALPH HAROLD, M.B., Ch.M., 1922 (Univ. Sydney), Bridge Road, Lane Cove.
MACKEY, WALLACE ARTHUR ARUNDEL, M.B., Ch.M., 1922 (Univ. Sydney), Livingstone Road, Marrickville.
MADDEN, JOHN PATRICK CAWLEY, M.B., Ch.M., 1922 (Univ. Sydney), Railway Parade, Wollongong.
MAGILL, DAVID WILSON, M.B., Ch.M., 1922 (Univ. Sydney), Sydney Hospital.
MAGUIRE, BERTRAND FRANCIS MARTIN, M.B., Ch.M., 1922 (Univ. Sydney), 16, Albert Parade, Ashfield.
MARSHALL, GEOFFREY EDWIN LAMPORT, M.B., Ch.M., 1922 (Univ. Sydney), Royal North Shore Hospital of Sydney, St. Leonards.
MCCANN, FRANCIS BEDE, M.B., Ch.M., 1922 (Univ. Sydney), Alexander Street, Crow's Nest.
MINOGUE, SYLVESTER JOHN, M.B., Ch.M., 1922 (Univ. Sydney), Lithgow Street, Crow's Nest.
MOSS, HENRY ST. LEGER, M.B., 1922 (Univ. Sydney), Lindfield.
OLVER, LLOYD REATH, M.B., Ch.M., 1922 (Univ. Sydney), "Nenton Gymps," Chatswood.
PARK, ALEXANDER NORMAN, M.B., Ch.M., 1922 (Univ. Sydney), 3, Beaufort Street, Croydon.
PATON, CLIVE NINESS, M.B., Ch.M., 1922 (Univ. Sydney), 12, Grosvenor Crescent, Summer Hill.
POTTS, KEITH FAULKNER, M.B., Ch.M., 1922 (Univ. Sydney), c.o. Methodist Ladies' College, Burwood.
PURCHAS, ARTHUR JOHN MAURICE, M.B., Ch.M., 1922 (Univ. Sydney), Sydney Hospital.
RADCLIFFE, DOUGLAS GORDON, M.B., Ch.M., 1922 (Univ. Sydney), 433, Bourke Street, Sydney.
ROPER, CECIL VALENTINE, M.B., Ch.M., 1922 (Univ. Sydney), 107, Shadforth Street, Mosman.
RYAN, HAROLD ALEXANDER, M.B., Ch.M., 1922 (Univ. Sydney), Bunnerong Road, Matraville.
SMALL, THOMAS HENRY, M.B., Ch.M., 1922 (Univ. Sydney), Wyse Street, Albury.
STEPHENS, HUGH SEVERIN, M.B., Ch.M., 1922 (Univ. Sydney), St. Paul's College, Newtown.
THOMPSON, GEORGE SYDNEY, M.B., Ch.M., 1922 (Univ. Sydney), Nielsen Avenue, Kogarah.
VERBRUGGHEN, ADRIEN HENRI PIERRE EUGENE, M.B., Ch.M., 1922 (Univ. Sydney), "Braemar," Wahroonga.
WILLIAMS, ROMA SELWYN, M.B., Ch.M., 1922 (Univ. Sydney), 21, Crow's Nest Road, North Sydney.
YATES, ARTHUR CHARLES KINGSGATE, M.B., Ch.M., 1922 (Univ. Sydney), Bennett Street, Bondi.
ZIMMERMAN, CARL JOHN, M.B., Ch.M., 1922 (Univ. Sydney), Birrell Street, Bondi.

Additional Registrations.

MINNETT, ROY BALDWIN, Ch.M., 1922 (Univ. Sydney), Wentworth Street, Manly.
WOOD, WILLIAM, D.P.H., 1922 (Univ. Sydney), Hall Street, Bondi.

VICTORIA.

THE undermentioned have been registered under the provisions of the *Medical Act, 1915*, as duly qualified medical practitioners:

ANDREW, JAMES MOORE, M.B., B.S., 1922 (Univ. Melbourne), "Burculey," Colbinabbin West.
ASHKENASY, MARK, M.B., B.S., 1922 (Univ. Melbourne), 92, Station Street, Carlton.
BARNETT, TREVOR SAMUEL MONTAGUE, M.B., B.S., 1922 (Univ. Melbourne), 101, Balaclava Road, Caulfield.
BRYCE, LUCY MEREDITH, M.B., B.S., 1922 (Univ. Melbourne), 22, Victoria Avenue, Canterbury.
BURNET, FRANK MACFARLANE, M.B., B.S., 1922 (Univ. Melbourne), Reservoir Road, Traralgon.
BYRNE, JOHN EDWARD, M.B., B.S., 1922 (Univ. Melbourne), 308, Dandenong Road, East St. Kilda.
CAMERON, GORDON ROY, M.B., B.S., 1922 (Univ. Melbourne), 45, Blessington Street, St. Kilda.
CAMERON, IAN THOMAS, M.B., B.S., 1922 (Univ. Melbourne), 65, Pakington Street, Kew.
CAMPBELL, KATE ISABEL, M.B., B.S., 1922 (Univ. Melbourne), 5, Elphin Grove, Glenferrie.
CLARK, ALEXANDRA MARGARET ANNIE, M.B., B.S., 1922 (Univ. Melbourne), Burwood Road, Burwood.
CLARK, FREDERICK JOHN, M.B., B.S., 1922 (Univ. Melbourne), Burwood Road, Burwood.
COOK, WILLIAM STANLEY, M.B., B.S., 1922 (Univ. Melbourne), Melbourne Hospital.
CORKILL, ARTHUR BASIL, M.B., B.S., 1922 (Univ. Melbourne), Alfred Hospital, Prahran.
CURWEN-WALKER, MALCOLM CLAUDE, M.B., B.S., 1922 (Univ. Melbourne), 13, Lewisham Road, Windsor.
DRAKE, FRANCIS JAMES BAIN, M.B., B.S., 1922 (Univ. Melbourne), 20, Nelson Street, Mont Albert.
DUNCOMBE, CEDRIC, M.B., B.S., 1922 (Univ. Melbourne), 41, Walsh Street, South Yarra.
GRIFFITHS, WILLIAM RAYMOND DUDLEY, M.B., B.S., 1922 (Univ. Melbourne), Albert Street, Sebastopol.
HALL, REGINALD DALTON MCKELLAR, M.B., B.S., 1922 (Univ. Melbourne), c.o. Union Bank, Collins Street, Melbourne.
HAWKINS, HENRY RUPERT, M.B., B.S., 1922 (Univ. Melbourne), "Cooruburt," Avalon Road, Armadale.
HEWITSON, MAGGIE, M.B., B.S., 1922 (Univ. Melbourne), 47, Victoria Street, Williamstown.
HOME, ARTHUR ROBINSON, M.B., B.S., 1922 (Univ. Melbourne), Main Street, Elsternwick.
HUMPHREY, MARY JOURNEAUX, M.B., B.S., 1922 (Univ. Melbourne), 10, Grandview Grove, Armadale.
LEMMON, WILLIAM MORTON, M.B., B.S., 1922 (Univ. Melbourne), 36, Glenferrie Road, Kew.
LENNON, LAURENCE REUBEN, M.B., B.S., 1922 (Univ. Melbourne), 7, Chrystobel Crescent, Hawthorn.
LINK, HAROLD SELBY, M.B., B.S., 1922 (Univ. Melbourne), 44, High Street, Kew.

LITTLEJOHN, JEAN, M.B., B.S., 1922 (Univ. Melbourne), Scotch College, East Melbourne.
MACKAY, KATE, M.B., B.S., 1922 (Univ. Melbourne), 7, Stanley Street, Elsternwick.
MACNAMARA, ANNIE JEAN, M.B., B.S., 1922 (Univ. Melbourne), 92, Wattletree Road, Malvern.
MALLALIEU, CLIFFORD SCHOFIELD, M.B., B.S., 1922 (Univ. Melbourne), Methodist Parsonage, Victoria Street, Footscray.
MCCOWAN, DOUGLAS DUNCAN, M.B., B.S., 1922 (Univ. Melbourne), 18, Walmer Street, Kew.
MCKENZIE, STANLEY ARNOLD, M.B., Ch.M., 1922 (Univ. Melbourne), "Glenview," Broadford.
MCRAE, STEWART CLIFTON JOHN, M.B., B.S., 1922 (Univ. Melbourne), 49, Matlock Street, Canterbury.
PENINGTON, GEOFFREY ALFRED, M.B., B.S., 1922 (Univ. Melbourne), 11, Victoria Crescent, Mont Albert.
PHIPPS, KATHLEEN ELIZABETH, M.B., B.S., 1922 (Univ. Melbourne), 63, Wheatland Road, Malvern.
RAWSON, OBY WILLIAM, M.B., B.S., 1922 (Univ. Melbourne), E., S. & A. Bank, Northcote.
READING, FANNY, M.B., B.S., 1922 (Univ. Melbourne), 23, Charnwood Road, St. Kilda.
REUTON, DOUGLAS GEORGE, M.B., B.S., 1922 (Univ. Melbourne), 78, Story Street, Parkville.
SIMPSON, GEORGE, M.B., B.S., 1922 (Univ. Melbourne), "Clifton," Hamilton.
STEWART, DONALD GEDDES, M.B., B.S., 1922 (Univ. Melbourne), "Craigie," Napier Crescent, Essendon.
TIGHE, LEO MICHAEL, M.B., B.S., 1922 (Univ. Melbourne), 28, Chaucer Street, St. Kilda.
TROUP, GILBERT REYNOLDS, M.B., B.S., 1922 (Univ. Melbourne), 39, Grandview Grove, Armadale.
WALLACE, FREDERICK HILTON, M.B., Ch.M. 1917 (Univ. Sydney), La Trobe Terrace, Geelong.
WILLIAMS, CLIVE GOWAN, M.B., B.S., 1922 (Univ. Melbourne), 22, Mason Street, West Hawthorn.
WILLIS, RUPERT ALLAN, M.B., B.S., 1922 (Univ. Melbourne), Alfred Hospital, Prahran.

Name of deceased practitioner removed from the Register:

FAULKNER, WILLIAM COOKE.

Additional diploma registered:

TRUE, FRANK ELLIOTT TRENOWETH, M.D., 1921 (Univ. Melbourne).

Medical Appointments.

THE undermentioned have been appointed Junior Resident Medical Officers at the Perth Hospital, Western Australia: DR. L. M. CORBET, DR. W. R. FRAYNE, DR. L. LE SOUEF, DR. R. MILLER.

* * * *

THE COMMISSION OF PUBLIC HEALTH OF VICTORIA has appointed the undermentioned as places for public vaccination at stated hours: The surgery of DR. D. BICKART (B.M.A.) at Somerville, the surgery of DR. P. G. CLARKE at Ballan, the surgery of DR. W. J. FLANAGAN (B.M.A.) at Donald, the surgery of DR. B. D. FETHERS (B.M.A.) at Ormond, the surgery of DR. W. I. HAYES (B.M.A.) at Heidelberg, the surgery of DR. S. RABL (B.M.A.) at Murtoa, the surgery of DR. E. S. G. K. VANCE (B.M.A.) at Violet Town, the surgery of DR. E. E. WEBSTER (B.M.A.) at Brighton.

Medical Appointments Vacant, etc.

FOR announcements of medical appointments vacant, assistants, *locum tenentes* sought, etc., see "Advertiser," page xviii..

ISISFORD DISTRICT HOSPITAL (CENTRAL QUEENSLAND): Medical Officer.

TASMAN MUNICIPAL COUNCIL, KOONYA, TASMANIA: Medical Officer of Health.

Medical Appointments: Important Notice.

MEDICAL practitioners are requested not to apply for any appointment referred to in the following table, without having first communicated with the Honorary Secretary of the Branch named in the first column, or with the Medical Secretary of the British Medical Association, 429, Strand, London, W.C..

BRANCH.	APPOINTMENTS.
NEW SOUTH WALES: Honorary Secretary, 30 - 34, Elizabeth Street, Sydney	Australian Natives' Association Ashfield and District Friendly Societies' Dispensary Balmain United Friendly Societies' Dispensary Friendly Societies Lodges at Casino Leichhardt and Petersham Dispensary Manchester Unity Oddfellows' Medical Institute, Elizabeth Street, Sydney Marrickville United Friendly Societies' Dispensary North Sydney United Friendly Societies People's Prudential Benefit Society Phœnix Mutual Provident Society
VICTORIA: Honorary Secretary, Medical Society Hall, East Melbourne	All Institutes or Medical Dispensaries Australian Prudential Association Proprietary, Limited Manchester Unity Independent Order of Oddfellows Mutual National Provident Club National Provident Association
QUEENSLAND: Honorary Secretary, B.M.A. Building, Adelaide Street, Brisbane	Brisbane United Friendly Society Institute Hampden District Hospital, Kuridala, North Queensland Stannary Hills Hospital
SOUTH AUSTRALIA: Honorary Secretary, 12, North Terrace, Adelaide	Contract Practice Appointments at Renmark Contract Practice Appointments in South Australia
WESTERN AUSTRALIA: Honorary Secretary, Saint George's Terrace, Perth	All Contract Practice Appointments in Western Australia
NEW ZEALAND (WELLINGTON DIVISION): Honorary Secretary, Wellington	Friendly Society Lodges, Wellington, New Zealand

Diary for the Month.

JUNE 10.—Eastern District Medical Association, New South Wales.
JUNE 13.—New South Wales Branch, B.M.A.: Ethics Committee.
JUNE 14.—Western Australian Branch, B.M.A.: Council.
JUNE 14.—Melbourne Pædiatric Society.
JUNE 15.—Victorian Branch, B.M.A.: Council.
JUNE 16.—Eastern Suburbs Medical Association, New South Wales.
JUNE 20.—New South Wales Branch, B.M.A.: Executive and Finance Committee.
JUNE 21.—Western Australian Branch, B.M.A.: Branch.
JUNE 21.—South Sydney Medical Association, New South Wales.
JUNE 22.—Brisbane Hospital for Sick Children: Clinical Meeting.
JUNE 23.—Queensland Branch, B.M.A.: Council.
JUNE 27.—New South Wales Branch, B.M.A.: Medical Politics Committee; Organization and Science Committee.
JUNE 28.—Victorian Branch, B.M.A.: Council.
JUNE 29.—South Australian Branch, B.M.A.: Annual General Meeting.
JUNE 30.—New South Wales Branch, B.M.A.: Branch.

Editorial Notices.

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All communications should be addressed to "The Editor," THE MEDICAL JOURNAL OF AUSTRALIA, B.M.A. Building, 30-34, Elizabeth Street, Sydney. (Telephone: B. 4635.)

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